2.3 PHYSICAL ENVIRONMENT

2.3.1 Water Quality and Storm Water Runoff

2.3.1.1 Regulatory Setting

Section 401 of the Clean Water Act requires water quality certification from the State Water Resources Control Board (SWRCB) or a Regional Water Quality Control Board (RWQCB) when the project requires a Federal permit. Typically this means a Clean Water Act Section 404 permit to discharge dredge or fill into a water of the United States, or a permit from the Coast Guard to construct a bridge or causeway over a navigable water of the United States under the Rivers and Harbors Act.

Along with Clean Water Act Section 401, Section 402 establishes the National Pollutant Discharge Elimination System (NPDES) for the discharge of any pollutant into waters of the United States. The Federal Environmental Protection Agency has delegated administration of the NPDES program to the SWRCB and the nine RWQCBs. To ensure compliance with Section 402, the SWRCB has developed and issues the Department an MPHES Statewide Storm Water Permit to regulate storm water and non-storm water discharges from Department right-of-way, properties and facilities. This same permit also allows storm water and non-storm water discharges into Waters of the State pursuant to the Porter-Cologne Water Quality Act.

Storm water discharges from the Department's construction activities disturbing one acre or more of soil are permitted under the Department's Statewide Storm Water NPDES permit. These discharges must also comply with the substantive provisions of the SWRCB's Statewide General Construction Permit. Non-Departmental construction projects (encroachments) are permitted and regulated by the SWRCB's Statewide General Construction Permit. All construction projects exceeding one acre or more of disturbed soil require a Storm Water Pollution Prevention Plan (SWPPP) to be prepared and implemented during construction. The SWPPP, which identifies construction activities that may cause discharges of pollutants or waste into waters of the United States or waters or the State, as well as measures to control these pollutants is prepared by the construction contractor and is subject to Department review and approval.

Finally, the SWRCB and the RWQCBs have jurisdiction to enforce the Porter-Cologne Act to protect groundwater quality. Groundwater is not regulated by Federal law, but is regulated under the State's Porter-Cologne Act. Some projects may involve placement or replacement of on-site treatment systems (OWTS) such as leach fields or septic systems or propose implementation of infiltration or detention treatment systems which may pose a threat to groundwater quality. Currently, the OWTS program is without SWRCB regulation but you should be aware of threats to groundwater quality on the project site and evaluate and address accordingly in the environmental document. Design standards for installation and operation of infiltration and detention treatment systems should protect groundwater quality and those protections should also be addressed in the environmental document.

2.3.1.2 Affected Environment

The Project area is located within the San Leandro Creek Watershed. Although the Project is in this watershed, it does not drain to San Leandro Creek; the Project discharges into the local municipal separate storm sewer system (MS4) (under the City of Oakland's jurisdiction), which drains directly to the Oakland Estuary/Damon Channel which drains to central San Francisco Bay. San Francisco Bay outlets to the Pacific Ocean. A review of the Flood Boundary and Floodway Map from the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA) indicates that the Project study area is not located within either a 100-year or 500-year floodplain.

Runoff from existing I-880 discharges into drainage inlets, which discharge to a local MS4 system. This system drains directly to the Oakland Estuary/Damon Channel which drains to San Francisco Bay. The identification of Total Maximum Daily Load (TMDL) water quality impairments listed for the San Francisco Bay are currently being developed or amended as related to sediment and siltation and require approval by the San Francisco Bay RWQCB.

There are no sole-source aquifers and no evident public water sources in the Project area. Groundwater at the site is typically at about 5 to 15 feet below the ground surface.

2.3.1.3 Environmental Consequences

No surface waterways would be affected by implementation of the proposed Build Alternative.

During excavations for drilled piers, shallow spread footings, or utility trenching, dewatering and/or shoring methods will need to be implemented. Testing of the dewatering groundwater will be required to determine if it is contaminated or exceeds discharge standards of the San Francisco Bay Water Quality Control Basin Plan. Dewatering may be used as a dust control measure as long as it does not cause erosion, scouring, or sediment discharges. If the dewatered groundwater has an odor or discoloration, oil sheen, or foam, the preferred method of discharge is to a Publicly Owned Treatment Works.

The Build Alternative consists of lane additions, which would result in a permanent increase of impervious surfaces and a permanent increase in runoff and pollutant loading. The Build Alternative would increase the impervious area by less than 1.48 acres compared to the existing freeway facility. Currently, stormwater runoff from I-880 within the Project limits is untreated. As part of the Proposed Project, treatment Best Management Practices (BMPs) must be implemented to target the constituents of concern in the stormwater runoff from the Project area.

Under the No Build Alternative, there would not be an increase in impervious area nor change in land use on the I-880. Therefore, the No Build Alternative would not result in an increase in long-term pollutant loading; however, existing runoff would remain untreated.

Temporary Construction Impacts

During construction, the total disturbed area from the Proposed Project is estimated to be less than 4.8 acres. The potential effects from the construction of the proposed Build Alternative on the quality of the water in the area will come from runoff from construction and unpaved areas (erosion/siltation).

Under the No Build Alternative, no improvements, other than routine roadway and bridge maintenance, would be made. Therefore, the No Build Alternative would result in no short-term water quality impacts from construction-related activities.

2.3.1.4 Avoidance, Minimization, and/or Mitigation Measures

The Department's Stormwater Management Plan (SWMP) is the guidance for compliance with the NPDES Permit requirement for discharge. As part of the Department's Project Delivery Stormwater Management Program described in the SWMP, selected Construction Site, Design Pollution Prevention, and Treatment Control BMPs would be incorporated into the final design of the Proposed Project. Compliance with the standard requirements of the SWMP for potential short-term (during construction) and long-term (post construction/maintenance) impacts, listed below in minimization measures, as related to water quality (WQ), is required.

WQ-1 To minimize potential adverse impacts, the preparation and implementation of construction site BMPs in compliance with the provisions of the Department's Statewide NPDES Permit (Order No. 99-06-DWQ NPDES No. CAS000003) and any subsequent permit as they relate to construction activities for the Project will be required. This will include submission of a Notice of Construction (NOC) to the San Francisco RWQCB at least 30 days before the start of construction, preparation and implementation of a SWPPP, and submission of a Notice of Construction Completion (NCC) to the San Francisco RWQCB upon completion of construction and stabilization of the Project site.

WQ-2 Consideration and incorporation of design pollution prevention (DPPs) and Treatment Control BMPs for the Project in accordance with the procedures outlined in the Stormwater Quality Handbooks, Project Planning and Design Guide (May 2007 or subsequent issuance) will be followed. This will include coordination with the San Francisco RWQCB with respect to feasibility, maintenance, and monitoring of Treatment Control BMPs as set forth in the Department's Statewide SWMP.

WQ-3 During dewatering activities, if necessary, the provision of the General Waste Discharge requirements for discharges to surface waters that pose an insignificant (de minimis) Threat to Water Quality will be required.

2.3.2 Geology/Soils/Seismic/Topography

2.3.2.1 Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under the California Environmental Quality Act.

This section also discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing the seismic hazard for Department projects. The current policy is to use the anticipated Maximum Credible Earthquake (MCE), from young faults in and near California. The MCE is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

2.3.2.2 Affected Environment

The Project study area is located on the Oakland alluvial plain that generally slopes gently to the west towards the San Francisco Bay. The study area, with the exception of the existing approach embankments, is relatively flat. Elevations in the Project area range between approximately 10 and 30 feet above mean sea level (msl) (USGS, 1997). Slopes in the Project area are present where up to approximately 15 feet of fill has been placed at the approach embankments for the bridge abutments. Retaining walls support portions of the approach embankments. The map of historic high groundwater levels presented within the Seismic Hazard Zone report for the Oakland East and part of the Las Trampas Ridge Quadrangle (CGS, 2003) indicates that the depth to historic high groundwater within the Project study area is between 5 and 10 feet below ground surface.

The numerous faults in northern California include active, potentially active, and inactive faults. The Project site is not located within an Alquist-Priolo Fault Rupture Hazard Zone established by the State Geologist (CDMG, 1982) to delineate regions of potential ground surface rupture adjacent to active faults. The closest known active fault is the Hayward fault located approximately 4.8 to 4.9 kilometers northeast of the Project site. Major known active faults in the region consist generally of en-echelon, northwest-striking, right-lateral, strike-slip faults. These include the Hayward, Calaveras, and Concord/Green Valley faults, located east of the site, and the San Andreas fault, located west of the site. The approximate locations of major faults in the region and their geographic relationship to the Project vicinity are shown on Exhibit 2.3-1, *Fault Location Map*.

Based on review of the referenced geologic maps, the subject site is not transected by nor underlain by known active faults (i.e., faults that exhibit evidence of ground displacement in the last 11,000 years). Therefore, the potential for ground surface rupture due to faulting at the site is considered low. However, lurching or cracking of the ground surface as a result of nearby seismic events, although rare, is possible. Additionally, structures on site may experience a relatively high degree of ground shaking following a significant seismic event on a nearby fault.

The strong vibratory motions generated by earthquakes can trigger a rapid loss of shear strength in saturated, loose, granular or fine-grained soils of low plasticity (liquefaction) or in wet, sensitive, cohesive soils (strain softening). Liquefaction can also generate sand boils leading to subsidence at the ground surface or lateral spreading of the ground surface atop liquefied subsurface layers. Liquefaction (or strain softening) is generally not a concern at depths more than 50 feet below ground surface. The Project site is located within a liquefaction hazard zone on the Map of Seismic Hazard Zones prepared by the California Geological Survey (CGS, 2003); refer to Exhibit 2.3-2, *Seismic Hazard Zones Map*.

A review of published geologic maps indicates that the Project study area is generally underlain by Quaternary alluvium. The study area is located on the east side of San Francisco Bay in the Coast Ranges geomorphic province of California. The Coast Ranges are comprised of several mountain ranges and structural valleys formed by tectonic processes commonly found around the Circum-Pacific belt. Basement rocks have been sheared, faulted, metamorphosed, and uplifted, and are separated by thick blankets of Cretaceous and Cenozoic sediments that fill structural valley and line continental margins. The San Francisco Bay area has several ranges that trend northwest-southeast, parallel to major strike-slip faults such as the San Andreas, Hayward, and Calaveras faults. Major tectonic activity associated with these and other faults within this regional tectonic framework consists primarily of right-lateral, strike-slip movement. The site is not located within a hazard zone for earthquake-induced landslides on the Map of Seismic Hazard Zones prepared by the California Geological Survey (CGS, 2003); refer to Exhibit 2.3-2, *Seismic Hazard Zones Map*.

2.3.2.3 Environmental Consequences

The Project study area is on the Oakland alluvial plain and is generally underlain by Quaternary alluvium. The trace of the Hayward fault is located about 3 miles northeast of the study area. As such, the proposed improvements may experience a relatively high degree of ground shaking during a significant seismic event on the Hayward fault. The improvements associated with the Build Alternative will reduce the likelihood of structural failure in an earthquake, as the improved interchange will be brought up to current seismic codes. Conformance with the California Building Code (CBC), as well as adherence to standard engineering practices and Department design criteria, would reduce the effects of seismic groundshaking.

Another potential hazard associated with earthquakes is liquefaction. Liquefaction is the loss of strength of cohesionless soils when the pore water pressure in the soil becomes equal to the confining pressure. Liquefaction generally occurs as a "quicksand" type of ground failure caused by strong groundshaking. The Primary factors influencing liquefaction potential include presence of shallow groundwater, soil type (i.e., fine sandy soils), relative density of the sandy soils confining pressure, and the intensity and duration of groundshaking. The study area is within a liquefaction hazard zone. Excavations for deep foundations may encounter groundwater and be unstable without casing, use of drilling mud or other stabilization techniques. A Liquefaction Evaluation for the Project, prepared by Ninyo and Moore, dated November 14, 2008, determined that the impact of liquefaction and related phenomena including dynamic settlement, lateral spreading, and sand boil induced subsidence, is considered low. Nonetheless, adherence with the CBC and standard Department design criteria would reduce the effects of liquefaction should it be experienced within the Project area during a considerable seismic event.

Shrink/swell behavior of expansive soils may reduce ride quality, cause premature deterioration of roadway pavements, and induce excessive rotation or heave of retaining walls supporting embankments, resulting in cracking or displacement of the roadway surface and restricting public use of a transportation resource. Review of available geologic data indicates that the soil within the study area may exhibit an expansive characteristic. Shrink/swell movement of the proposed pavements and retaining walls should be considered a potentially adverse impact to public use of a transportation resource unless minimized.

Erosion following construction of the proposed improvements may result in the loss of a soil resource. Continued erosion may reduce embankment stability and restrict public use of the transportation resource. Erosion following construction of the proposed improvements should be considered a potentially adverse impact to soil resources and public use of transportation resources unless minimized.

Temporary Construction Impacts

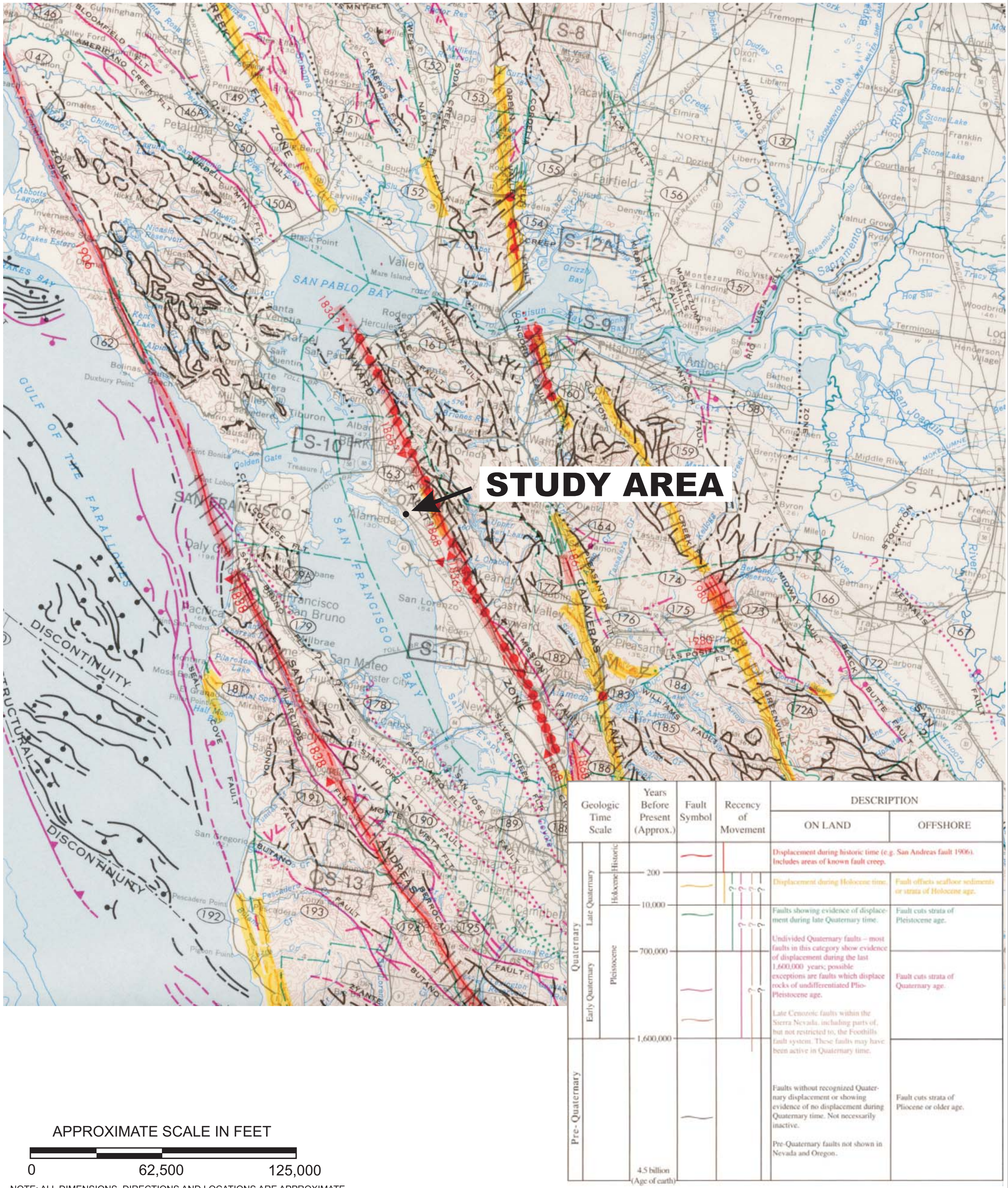
Impacts to public health and well-being, adjacent properties, and available resources that are related to the geologic environment may occur during construction of foundations and earthwork.

Grading for the overcrossing approach embankments would involve removal of the existing approach embankments, and replacement with compacted, engineered fill. Grading for new pavements would involve excavation and compaction of soil.

Pile driving would involve driving steel or concrete piles into the ground under the impact of a diesel or hydraulic hammer to provide foundation support for new overcrossing bents and abutments, and embankment retaining walls. Similar pile driving techniques would also be employed to drive steel shells for cast-in-steel-shell (CISS) piles to provide an alternate means of supporting bents, abutments, and retaining walls.

Pier drilling would involve drilling cylindrical holes into the ground, inserting reinforcing steel, and filling the holes with concrete to create cast-in-drilled-hole (CIDH) piers. The CIDH piers would provide foundation support for new overcrossing bents, abutments, and embankment retaining walls.

Construction of the proposed improvements would temporarily increase noise and vibration levels at locations adjacent to the Project site. Pile driving, in particular, has the potential to generate very high noise and vibration levels. High levels of noise and vibration can create a public nuisance and may damage nearby structures. Noise and vibration associated with the construction of the proposed improvements should be considered a potentially adverse impact to adjacent structures and public well-being unless minimized.



NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

REFERNECE: JENNINGS, C.W., 1994, FAULT ACTIVITY MAP OF CALIFORNIA AND ADJACENT AREAS, DEPARTMENT OF CONSERVATION, DIVISION OF MINES AND GEOLOGY; SCALE 1:750,000.

AECOM

RBF CONSULTING

INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS
AT 29TH AVENUE AND 23RD AVENUE OVERCROSSING IS/EA

Fault Location Map

SD Mac: 35100463.003/35100463PortraitLetter.indd

Exhibit 2.3-1

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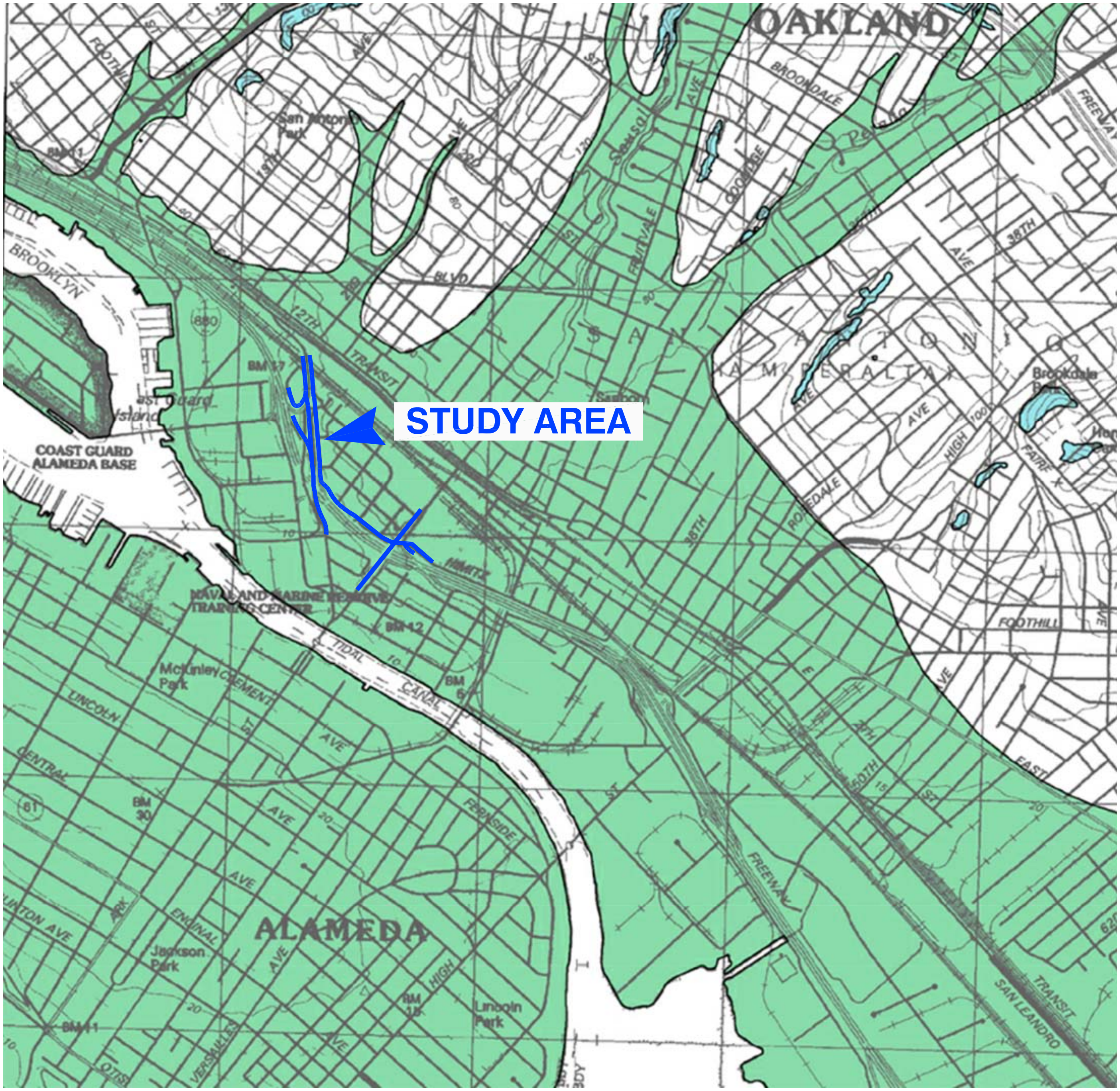

REFERENCE: CALIFORNIA GEOLOGICAL SURVEY, 2003, SIESMIC HAZARD ZONES,OAKLAND EAST AND PART OF THE LAS TRAMPAS RIDGE: QUADRANGLES,SCALE 1:24000.

SEISMIC HAZARDS

LIQUEFACTION

AREAS WHERE HISTORICAL OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTECHNICAL AND GROUNDWATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED.

EARTHQUAKE-INDUCED LANDSLIDES

AREAS WHERE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2696(c) WOULD BE REQUIRED.

APPROXIMATE SCALE IN FEET

0 2000 4000

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS
AT 29TH AVENUE AND 23RD AVENUE OVERCROSSING IS/EA

Seismic Hazard Zones Map

AECOM

RBF CONSULTING

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Exhibit 2.3-2

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Pile driving can heave and laterally displace the ground around the pile being installed, which can damage nearby structures and pavements. Ground heave related to pile driving is a potentially adverse impact to adjacent properties and to public use of nearby transportation resources unless minimized.

Excavations for drilled piers encountering relatively cohesionless soil or groundwater may collapse or cave, leading to subsidence of the ground around the pier location, potentially disrupting public use of nearby roadways and damaging structures on nearby properties. Ground subsidence related to pier drilling is a potentially adverse impact to adjacent property and public use of nearby transportation resources unless minimized.

Drilled pier excavations may encounter soil or groundwater contaminated with hazardous materials. Hazardous soils generated from pier drilling operations are a potentially adverse impact to public health unless minimized.

Earthwork operations during construction of the proposed improvements will increase the potential for erosion of soil disturbed by grading. Erosion and loss of soil disturbed by grading during construction of the proposed improvements is a potentially adverse impact to soil resources unless minimized.

2.3.2.4 Avoidance, Minimization, and/or Mitigation Measures

Implementation of the following minimization measures, related to geology, soils, seismic, and topography (GEO) impacts would reduce or eliminate the adverse effects of the Proposed Project:

GEO-1 To minimize potential impacts, the Project will be constructed in accordance with the CBC and all applicable Department standards and regulations. All construction activities will adhere to current engineering practices and recommendations provided by a Geotechnical Engineer/Engineering Geologist.

GEO-2 Minimization measures for expansive soils include mixing the surficial soil with lime to reduce the expansion characteristic of the soil or removal of the surficial soil and replacement with a nonexpansive material.

GEO-3 Minimization measures to reduce the impact of erosion include appropriate vegetative or hardscaping cover to stabilize soil against wind and water erosion, and construction of erosion resistant drainage structures (swales, curb/gutter, concrete channels, and drop inlets with underground piping) to collect surface water and divert it away from slopes to suitable discharge points.

GEO-4 Minimization measures for ground heave include use of drilled piers in lieu of driven piles, use of low-displacement piles, or pre-drilling pile locations prior to driving.

GEO-5 Measures to minimize the impact of ground subsidence due to pier drilling include use of driven piles in lieu of drilled piers, installation of temporary casing or use of drilling fluids (i.e., bentonite mud) to stabilize the excavation.

GEO-6 Measures to minimize the impact of hazardous soils include use of driven pile foundations in lieu of drilled piers, or additional study to evaluate the risk to public health and design the appropriate in-situ remediation or containment and disposal methodology.

GEO-7 Measures to minimize the impact of soil loss due to erosion during grading include construction of temporary swales to divert surface water from exposed soil, installation of silt fences and desilting basins to retain eroded soil, covering slopes of exposed soil with tarps or jute netting, and adherence to a SWPPP with appropriate monitoring.

2.3.3 Hazardous Waste / Materials

2.3.3.1 Regulatory Setting

Hazardous materials and hazardous wastes are regulated by many State and Federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health, and land use.

The primary Federal laws regulating hazardous waste/materials are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The purpose of CERCLA, often referred to as the Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. RCRA provides for "cradle to grave" regulation of hazardous wastes. Other Federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order 12088, Federal Compliance with Pollution Control, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

Hazardous waste in California is regulated primarily under the authority of the Federal Resource Conservation and Recovery Act of 1976 and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. Proper disposal of hazardous material is vital if it is disturbed during Project construction.

2.3.3.2 Affected Environment

An Initial Site Assessment (ISA) was conducted on November 20, 2006, for the Project site and immediately adjoining parcels in concert with a governmental regulatory database review. The ISA was conducted in accordance with the California Department of Transportation Project Development Procedures Manual, Appendix DD, Preparation Guidelines for Initial Site Assessment (ISA) Checklist for Hazardous Waste (Department, 1999), and current American Society for Testing and Materials (ASTM) standards, as appropriate. In addition to the environmental database review conducted on November 20, 2006, a subsequent database search was completed on July 31, 2009. The purpose of the second database review was to update the ISA checklist and to identify any new property listings and new databases. Properties of possible environmental concern discussed in the following section are those properties that were identified from environmental databases of regulated facilities, historical sources reviewed, and the site reconnaissance. The database review was performed in an effort to identify listed hazardous wastes sites within the Project boundaries and adjacent to the Project boundaries. The study did not include an evaluation of geotechnical conditions or potential geologic hazards.

Transportation of hazardous materials/wastes in the Project area has historically occurred along I-880. Until the mid-1980s, gasoline and other fuels contained lead, a toxic metal. As each car or truck traveled the roadways, such as I-880, tiny particles of lead were released in the exhaust and settled on the soils next to the roadway alignment. Most of the time, lead tends not to move very far or fast in the environment.

2.3.3.3 Environmental Consequences

The Proposed Project consists of reconfiguring the off-ramps at 23rd and 29th Avenues, the on-ramp at Lisbon Avenue, and constructing a sound wall on the north side of I-880 between 29th Avenue and 23rd Avenue. Road work will also occur on East 8th, 9th, and 10th Streets, and Portwood Avenue.

Properties of potential environmental concern to the site were identified by field observations, historical research, an environmental database search, and review of agency files. Based on factors including discussions with regulatory agencies, review of agency files, historical research, and distances from the site, the technical specialist identified nine properties that have a potential to impact shallow soils and groundwater in areas where excavation will occur during site construction activities. These properties present a concern in potential excavation, dewatering, or any other activity involving potential exposure to groundwater or soil.

Evidence of Recognized Environmental Conditions (RECs) within the boundary of the subject site was observed during the November 20, 2006 site inspection. During the site inspection, a visual survey of the site for potential polychlorinated biphenyl (PCB)-containing transformers, related equipment, drums, and storage containers was conducted. One pad-mounted transformer, owned and operated by Pacific Gas and Electric (PG&E), was noted at Lazear School, 10 meters (30 feet) from East 9th Street. At the time of the site reconnaissance, the transformer appeared to be in good condition, with no signs of leakage on the transformer or on the ground surface beneath the area of the transformer.

Based on the current operating status of the Shell gas station, hazardous materials and hazardous wastes are likely to be stored at this facility. Other properties that may contain hazardous materials include: Universal Metal Polishing; Supreme Interior Custom Upholstery; D. Nichols Painting; Wallace Electric; Wow Carpet Cleaning; Bay Area Auto; Eandi Metal Works; Mor-Drop Blacksmith Shop; an auto shop at 3009 Elmwood Avenue; and, a machine shop at 2834 7th Street.

Several areas of exposed soil were observed under and adjacent to I-880. The soils appeared to be composed of fill in many areas, which may be from sources where hazardous materials were stored or used. Additionally, aerial deposited lead originating from vehicular emissions may have impacted the areas of exposed soil adjacent to I-880.

An environmental information database (EDR) search was performed on November 30, 2006, and on July 31, 2009, which included Federal, State, and local databases. The review was conducted to evaluate whether the site or properties within the vicinity of the site have been identified as having experienced significant unauthorized releases of hazardous substances or other events with potentially adverse environmental effects.

The EDRs searched include a discussion of the regulatory status of the listed facilities and any potential environmental impact to the site. The groundwater gradient information provided indicates whether the individual facility is upgradient of, downgradient from, or cross-gradient to the site in terms of groundwater flow. Groundwater directions were determined based on a review of groundwater information contained in subsurface evaluation reports reviewed for properties in the site vicinity, which indicated that groundwater flow varied from the northwest to southwest direction.

The November 30, 2006 database search identified several surrounding properties of potential environmental concern on various databases. In addition, 26 non-geocoded properties were identified in the vicinity of the site. However, based on the address information provided, it appears that these facilities are located at distances from the site that would not present an environmental concern.

The July 31, 2009 database search identified several surrounding properties of potential environmental concern on various databases. In addition, two new databases that were not available during the initial database search were utilized in the subsequent database search. A total of 61 new listings were identified; however, 52 of these sites were identified to be either downgradient from and/or outside the site boundaries, or are closed cases. Of the nine sites identified to be of a potential environmental concern, seven were listed in a new database (RCRA Non-generator Facilities), one was previously listed as closed but is now listed as open, and the other, the Esposito Plating and Polishing Company, in addition to being listed in other database sites, is currently listed in the Voluntary Cleanup Program (VCP) Facilities database.

The Leaking Underground Storage Tank (LUST) Incident Reports contain an inventory of reported leaking UST incidents. These lists are maintained by the SWRCB Leaking Underground Storage Tank Information System, Regional Water Quality Control Boards, and County Environmental Health Departments. This database was updated in September 2004. A total of five properties were listed on-site, upgradient of, and/or close enough to the Project site to be of potential environmental concern:

- **California Department of Transportation District 4**, 1112 29th Avenue, approximately 200 meters (650 feet) northeast of the site. A groundwater plume containing methyl tertiary butyl ether (MTBE) at this location, off site and downgradient groundwater in the vicinity of the site excavation areas, was identified through this database search. However, the MTBE groundwater plume is contained within or just outside property boundaries according to 2006 report, and does not appear to be a threat to site soil or groundwater.
- **Lemoine Cold Storage**, 630 29th Avenue, located onsite, adjacent to the south section of the site. This site is listed as an open LUST case. The 2006 report indicated groundwater flow direction toward the west. Property has history of groundwater contamination, including Total Petroleum Hydrocarbons – Gasoline (TPH-G); Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX); Trichloroethylene (TCE); Dichloroethylene (DCE); Dichloroethane (DCA); and, vinyl chloride. The 2006 monitoring report indicates BTEX, TCE, and DCE groundwater contamination on 29th Avenue and Chapman Street, so site oil and groundwater are potentially affected.
- **Eandi Metal Works Inc.**, 976 23rd Avenue, located approximately 120 meters (380 feet) north-northwest of the site. Listed as an open LUST case in the EDR report; upgradient groundwater potentially affected. Not listed on Geotrack, with a moderate possibility that site soil and groundwater are contaminated.
- **23rd Avenue Partners/Heitz Trucking, Inc.**, 1125 Miller Avenue, located approximately 275 meters (900 feet) north-northwest of the site. This site is listed as an open LUST case in the EDR report as a result of potential diesel water contamination where an aquifer is affected. No groundwater gradient information was available; however, site soil or groundwater unlikely to be impacted by this property.
- **Bay Area Diablo (Golden Gate) Petroleum Company**, 421 23rd Avenue, is located approximately 56 meters (186 feet) west-southwest of the site. This site is listed as an open LUST case in the EDR report as a result of MTBE contamination. However, groundwater flow is toward the southwest, and contamination does not appear to impact site soil or groundwater.

The Cortese List, pursuant to Section 656962.5 of the Government Code, compiles all known hazardous waste sites identified by State Agencies. Three Cortese sites have been reported within the boundaries or upgradient of and/or close enough to the site to be of potential environmental concern. All three of these properties, California Department of Transportation District 4, Lemoine Cold Storage, and Eandi Metal Works, Inc., are described above under the LUST discussion.

The California Hazardous Material Incident Report System (CHMIRS), which contains information on reported surficial hazardous material incidents (i.e., accidental releases or spills), did not identify any properties that associated with material spill incidents within the vicinity of the proposed improvements.

Alameda Contaminated Sites (CS) sites include a listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the LUST Program (soil and groundwater contamination from leaking petroleum USTs). Nine properties were listed upgradient of and/or close enough to the site to be of potential environmental concern, five of which have been described above under the LUST discussion: California Department of Transportation District 4, Lemoine Cold Storage, Eandi Metal Works, Inc., 23rd Avenue Partners/Heitz Trucking, Inc., and Bay Area Diablo (Golden Gate) Petroleum Company. The remaining four are described below:

- **Kilpatricks/Earthgrains Bakery**, 955 Kennedy Street, located approximately 61 meters (200 feet) northwest of the site. The leak on this property into the aquifer is being confirmed. Groundwater or site soil contamination appears unlikely. This site was listed as closed in the first EDR report, but was identified to be an open Site Assessment for Earthgrains Baking Company during the most recent database records search.
- **Former Del Monte Plant #237**, 3100 East 9th Street, located adjacent to northeast section of the site. Former Del-Monte Plant received case closure from RWQCB in January 2005. Residual groundwater contamination may exist in areas of excavation south of property within the site boundaries.
- **Hans and Gunter Roofing Company**, 2834 East 7th Street, located adjacent to south section of the site. The leak on this property is being confirmed with RWQCB and impact to groundwater is unknown.
- **Lucasey Manufacturing Corporation**, 2744 East 11th Street, located approximately 37 meters (120) feet north of the site. This property may have stored and used solvents that impact groundwater within the proposed area of excavation.

The RCRA Non-generator Facilities database is a new database that was not available at the time of the previous report. It includes selective information on sites which generate, transport, store, treat, and/or dispose of hazardous waste as defined by RCRA. Seven properties were listed within a 0.4-kilometer (0.25-mile) radius of the site. The facilities include Bay Area Petroleum at 421 23rd Ave, Savon Drugs at 3100 East 9th Street, Moore and Sons Trucking at 410 Kennedy Streets, F & F Precision Grinding at 510 Derby Street, Shell Oil Company Oakland Plant at 315 Derby Street, UC Household Shipping at 353 Lancaster Street, and Oceanic Boatworks Company at 1899 Dennison Street. According to the description of the RCRA Non-generator Facilities database, non-generators, including the facilities listed above, do not presently generate hazardous waste. This, combined with the fact that none of these facilities is listed on the EPA Regulated TRI Facilities as facilities reporting releases of hazardous materials, indicates that the facilities are not an environmental concern. These properties may handle hazardous waste; however, they do not currently generate hazardous waste. According to this EDR report information, no violations or specific environmental concerns were noted for any of these properties.

The VCP Facilities database did not previously list the Esposito Plating and Polishing Company located at 2904 Chapman Street as a potential concern to the site; however, the database was updated in March 2008 and now includes this site as a potential concern. However, this site was listed on other database sites during the database search associated with the ISA prepared for the Project and was determined to have a minor possibility that site soil and groundwater are contaminated.

All other database search results did not list any additional properties that were of environmental concern, or determined that properties with potential for environmental concern were located far enough from the Project site that there was a low likelihood that the properties had adversely affected the environmental integrity of the site.

Temporary Construction Impacts

Temporary impacts relative to hazardous wastes/materials associated with the Build Alternatives are confined to construction activities which are described in detail below. During the short-term period of Project construction, there is a possibility of accidental release of hazardous substances. A non-destructive asbestos and lead-based paint (LBP) survey was completed to evaluate the Project area for the presences of asbestos containing materials (ACMs) and LBPs. This survey was conducted to assess site conditions to assist in planning for proposed demolition/renovation activities on the Project site and surrounding areas. The surveys consisted of collecting suspect ACMs and LBP samples from the overcrossing structures and surrounding areas. Should construction activities result in the removal of yellow paint or thermoplastic traffic stripes, the generated waste shall be disposed of to an appropriate, permitted disposal facility. The level of risk associated with the accidental release of hazardous substances is not considered to be adverse due to the small volume and low concentration of hazardous materials utilized during construction.

As recommended in the ISA prepared for the Project, Aerially Deposited Lead (ADL) surveys and testing should be sampled and tested for lead prior to completion of the Project Approval/Environmental Document (PA/ED), so that any special handling, treatment, or disposal provisions associated with aerially deposited lead may be included in construction documents (if any ADL is present).

In addition, as recommended in the ISA prepared for the Project, a Limited Non-Destructive Asbestos and Lead-Based Paint Survey was completed for the Project. The findings of the survey are based on visual observations, limited analysis of suspect ACMs, and paint chip samples collected from within the Project area. Based on the reported analytical results associated with the suspect ACMs collected within the Project area during this survey, no ACMs were reported. Based on the analytical results of the paint chip samples collected during the survey, the three painted surfaces contained concentrations of lead greater than, or equal to, 1.0 mg/cm^3, or greater than, or equal to, 0.5 percent by weight (5,000 mg/kg).

2.3.3.4 Avoidance, Minimization, and/or Mitigation Measures

Implementation of the following avoidance and minimization measures, related to hazardous wastes and materials (HAZ) impacts, would reduce or eliminate the adverse effects of the Proposed Project:

HAZ-1 In order to avoid potential impacts, prior to construction, ADL surveys and testing will be conducted so that any special handling, treatment, or disposal provisions associated with ADL may be included in construction documents (if any ADL is present), ensuring compliance with any applicable special handling, treatment and/or disposal requirements for ADL material.

HAZ-2 Destructive sampling techniques were not employed during this ACMs and LBP survey. Therefore, there is a chance that additional suspect ACMs may be found during proposed renovations or demolition activities within the Project area. To minimize potential impacts, should additional suspect materials, not sampled or assessed in this report, be uncovered during renovation or demolition activities; (a) samples of suspect material should be collected for laboratory analysis, and all activities which may impact the materials should cease until laboratory analysis, or; (b) the materials should be assumed to be hazardous and handled as such.

HAZ-3 To minimize potential impacts, the identified materials/components with lead-based or lead-containing paint should not be sawed, burned, ground into mulch, or reused, and based on their condition, should be disposed of in a properly licensed landfill. Demolition/renovation workers should be protected according to the provisions of 8 CCR 1532, "Lead in Construction." Prior to demolition, a licensed lead-based paint removal contractor should remove the lead-based paint that is chipping or peeling from its substrate. The substrate can then be disposed of as construction debris. The remaining lead waste should be tested in accordance with Title 22 waste characterization requirements. Based upon the results of these tests, the waste should be disposed of appropriately.

HAZ-4 In order to minimize potential impacts, any transformers to be relocated during site construction/demolition should be conducted under the purview of the local utility purveyor to identify proper handling procedures regarding potential PCBs.

HAZ-5 The contractor would be required to use standard construction controls and safety procedures, which would avoid and minimize the potential for accidental release of hazardous substances into the environment. Standard construction practices would be observed such that any materials released are appropriately contained and remediated as required by local, state, and federal law.

2.3.4 Air Quality

2.3.4.1 Regulatory Setting

The Clean Air Act as amended in 1990 is the Federal law that governs air quality. Its counterpart in California is the California Clean Air Act of 1988. These laws set standards for the quantity of pollutants that can be in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). Standards have been established for six criteria pollutants that have been linked to potential health concerns; the criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), lead (Pb), and sulfur dioxide (SO_2).

Under the 1990 Clean Air Act Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to the State Implementation Plan for achieving the goals of the Clean Air Act requirements. Conformity with the Clean Air Act takes place on two levels – first, at the regional level and second, at project level. The Proposed Project must conform at both levels to be approved.

Regional level conformity in California is concerned with how well the region is meeting the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and particulate matter (PM). California is in attainment for the other criteria pollutants. At the regional level, Regional Transportation Plans (RTPs) are developed that include all of the transportation projects planned for a region over a period of years, usually at least 20. Based on the projects included in the RTP, an air quality model is run to determine whether or not the implementation of those projects would conform to emission budgets or other tests showing that attainment requirements of the Clean Air Act are met. If the conformity analysis is successful, the regional planning organization, such as the Association of Bay Area Governments (ABAG) for Alameda County and the appropriate Federal agencies, such as the Federal Highway Administration, make the determination that the RTP is in conformity with the State Implementation Plan for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP must be modified until conformity is attained. If the design and scope of the proposed transportation project are the same as described in the RTP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for carbon monoxide (CO) and/or particulate matter. A region is a "nonattainment" area if one or more monitoring stations in the region fail to attain the relevant standard. Areas that were previously designated as nonattainment areas but have recently met the standard are called "maintenance" areas. "Hot spot" analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA purposes. Conformity does include some specific standards for projects that require a hot spot analysis. In general, projects must not cause the CO standard to be violated, and in "nonattainment" areas, the project must not cause any increase in the number and severity of violations. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

2.3.4.2 Affected Environment

An Air Quality Assessment (March 3, 2009) was prepared for the Proposed Project. The Proposed Project is located in the City of Oakland, which is within the San Francisco Bay Area Air Basin (Basin), which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD) and the California Air Resources Board (CARB). This Basin includes San Mateo, Santa Clara, Alameda, Contra Costa, Napa, and Marin counties and forms a climatological subregion. This climatological subregion stretches from Richmond to San Leandro, bounded to the west by the San Francisco Bay and to the east by the Oakland-Berkeley Hills. The Oakland-Berkeley Hills have a ridgeline height of approximately 1,500 feet, a significant barrier to air flow. The most densely populated area of the subregion lies in a strip of land between the bay and the lower hills. The BAAQMD sets and enforces air pollutant regulations for stationary sources in the Basin while CARB is charged with controlling motor vehicle emissions.

In this area, marine air traveling through the Golden Gate, as well as across San Francisco and through the San Bruno Gap, is a dominant weather factor. The Oakland-Berkeley Hills cause the westerly flow of air to split off to the north and south of Oakland, which causes diminished wind speeds. The prevailing winds for most of this subregion are from the west. At the northern end, near Richmond, prevailing winds are from the south-southwest.

Temperatures in this subregion have a narrow range due to the proximity of the moderating marine air. Maximum temperatures in summer average in the mid-70's, with minimums in the mid-50's. Winter highs are in the mid- to high-50's, with lows in the low- to mid-40's.

The air pollution potential is lowest for the parts of the subregion that are closest to San Francisco Bay, largely due to good ventilation and less influx of pollutants from upwind sources. The occurrence of light winds in the evenings and early mornings occasionally causes elevated pollutant levels.

2.3.4.3 Environmental Consequences

Project Level Conformity

Ambient air quality is described in terms of compliance with Federal and State standards. Ambient air quality standards are the levels of air pollutant concentration considered safe to protect the public health and welfare. They are designed to protect people most sensitive to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise.

National air quality policies are regulated through the Federal Clean Air Act (FCAA) of 1970 and its 1977 and 1990 amendments. Pursuant to the FCAA, the EPA has established NAAQS for six air pollutants: carbon monoxide (CO), ozone (O_3) nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM_{10}), and lead (Pb). These pollutants are referred to as criteria pollutants because numerical criteria have been established for each pollutant, which define acceptable levels of exposure. The EPA has revised the NAAQS several times since their original implementation and would continue to do so as the health effects of exposure to air pollution are better understood. The NAAQS and CAAQS are summarized in Table 2.3-1, *National and California Ambient Air Quality Standards and Status.* The standards in Table 2.3-1, *National and California Ambient Air Quality Standards and Status,* reflect recent changes to the O_3, PM_{10}, and the new fine particulate matter ($PM_{2.5}$) standard.

Under the 1977 amendments to the FCAA, States with air quality that did not achieve the NAAQS were required to develop and maintain SIPs. These plans constitute a federal enforceable definition of the state's approach (or "plan") and schedule for the attainment of the NAAQS. Air quality management areas were designated as "attainment," "nonattainment," or "unclassified" for individual pollutants depending on whether or not they achieve the applicable NAAQS and CAAQS for each pollutant. It is important to note that because the NAAQS and CAAQS differ in many cases, it is possible for an area to be designated attainment under NAAQS but not meet the CAAQS for the same pollutant. Table 2.3-1, *National and California Ambient Air Quality*

Standards and Status, indicates the designations for both Federal and State standards for the Basin.

Regional Air Quality Conformity

The MTC's Transportation 2035 Plan (December 2008) is the current RTP for the San Francisco Bay Area. The MTC is the transportation planning, coordinating and financing agency for the nine-county San Francisco Bay Area and is responsible for adopting the Bay Area's regional transportation plan. The RTP was developed after a three-phase planning process over 20 months with extensive public involvement.

The RTP specifies a detailed set of investments and strategies throughout the region from 2005 through 2035 to maintain, manage and improve the surface transportation. Updated every three years to reflect new planning priorities and changing projections of growth and travel demand, the long-range plan must be based on a realistic forecast of future revenues. Taken as a whole, the projects included must help improve regional air quality. The RTP provides the basic policy and program framework for long-term investment in our vast regional transportation system in a coordinated, cooperative, and continuous manner. The Proposed Project is subject to the requirement to determine conformity.

Build Alternative

The Project is included in the RTP (RTP ID ALA050019). The Project is also programmed within the MTC 2008 Regional Transportation Improvement Program (RTIP). The 2008 RTIP is a capital listing of all proposed transportation projects and includes over $150 million in new programming capacity, mainly in the last two years of the five-year RTIP. The projects include highway improvements, transit, rail, and bus facilities, high occupancy vehicle lanes, signal synchronization, intersection improvements, freeway ramps, etc. These projects constitute a large investment of public funds. The Project is included in the RTIP for fiscal year (FY) 2008/90-2012/13.

Table 2.3-1: National and California Ambient Air Quality Standards and Status

Pollutant	Averaging Time	California[1]		Federal[2]	
		Standard[3]	Attainment Status	Standards[4]	Attainment Status
Ozone (O_3)	1 Hour	0.09 ppm (180 μg/m^3)	Serious Nonattainment	NA[5]	NA[5]
	8 Hours	0.07 ppm (137 μg/m^3)	Nonattainment	0.075 ppm (147 μg/m^3)	Nonattainment
Particulate Matter (PM_{10})	24 Hours	50 μg/m^3	Nonattainment	150 μg/m^3	Unclassified
	Annual Arithmetic Mean	20 μg/m^3	Nonattainment	NA	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	24 Hours	No Separate State Standard		35 μg/m^3	Nonattainment
	Annual Arithmetic Mean	12 μg/m^3	Nonattainment	15.0 μg/m^3	Nonattainment

Table 2.3-1: National and California Ambient Air Quality Standards and Status, continued

Pollutant	Averaging Time	California[1] Standard[3]	California[1] Attainment Status	Federal[2] Standards[4]	Federal[2] Attainment Status
Carbon Monoxide (CO)	8 Hours	9.0 ppm (10 μg/m^3)	Attainment	9 ppm (10 μg/m^3)	Attainment-Maintenance
	1 Hour	20 ppm (23 μg/m^3)	Attainment	35 ppm (40 μg/m^3)	Attainment-Maintenance
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 μg/m^3)	Attainment	0.053 ppm (100 μg/m^3)	Unclassified
	1 Hour	0.18 ppm (339 μg/m^3)	Attainment	NA	NA
Lead (Pb)	30 days average	1.5 μg/m^3	Attainment	NA	NA
	Calendar Quarter	NA	NA	1.5 μg/m^3	Unclassified
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	NA	NA	0.030 ppm (80 μg/m^3)	Attainment
	24 Hours	0.04 ppm (105 μg/m^3)	Attainment	0.14 ppm (365 μg/m^3)	Attainment
	3 Hours	NA	NA	NA	Attainment
	1 Hour	0.25 ppm (655 μg/m^3)	Attainment	NA	NA
Visibility-Reducing Particles	8 Hours (10 a.m. to 6 p.m., PST)	Extinction coefficient = 0.23 km@<70% RH	Unclassified	No Federal Standards	
Sulfates	24 Hour	25 μg/m^3	Attainment		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/ m^3)	Unclassified		

μg/m^3 = micrograms per cubic meter; ppm = parts per million; km = kilometer(s); RH = relative humidity; PST = Pacific Standard Time; NA = Not Applicable.

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, suspended particulate matter-PM_{10} and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations. In 1990, California Air Resources Board identified vinyl chloride as a toxic air contaminant, but determined that there was not sufficient available scientific evidence to support the identification of a threshold exposure level. This action allows the implementation of health-protective control measures at levels below the 0.010 ppm ambient concentration specified in the 1978 standard.

2. National standards (other than ozone, particulate matter and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The Environmental Protection Agency also may designate an area as attainment/unclassifiable, if: (1) it has monitored air quality data that show that the area has not violated the ozone standard over a three-year period; or (2) there is not enough information to determine the air quality in the area. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over the three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

3. Concentration is expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in

Table 2.3-1, National and California Ambient Air Quality Standards and Status, continued

this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
5. The Federal 1- hour ozone standard was revoked on June 15, 2005.
6. California Air Resources Board, Area Designation (Activities and Maps), http://www.arb.ca.gov/desig/desig.htm, accessed December 2008.
7. U.S. Environmental Protection Agency, The Green Book Nonattainment Areas for Criteria Pollutants, http://www.epa.gov/air/oaqps/greenbk/index.html, accessed December 2008.

Source: California Air Resources Board, November 17, 2008.

Additionally, the Project is included in the 2009 Transportation Improvement Program (TIP) (TIP ID ALA050019). The TIP is a comprehensive listing of all Bay Area surface transportation projects that are to receive Federal funding or are subject to Federally required action, or are considered regionally significant for Air Quality Conformity purposes. The TIP includes improvements for transit, local roadway, state highway, bicycle, and pedestrian facilities, along with other regionally significant, locally funded transportation projects, in the nine-county San Francisco Bay Area. The Project is included in the TIP during the four-year period from FY 2008/09-2011/12. The design concept and scope of the Project have not changed significantly from those listed in the conforming RTP and TIP. In addition, since the Proposed Project is in a conforming TIP and RTP it therefore conforms to the State Implementation Plan and the design concept and scope has not been altered from the description in the TIP and RTP.

Build Alternative (Roundabout)

Although the Build Alternative (Roundabout) would incorporate a roundabout into the East 9th Street/29th Avenue/northbound 29th Avenue on-ramp intersection, it would constitute a project of the same magnitude as the Build Alternative. The Proposed Project is included in the MTC RTP, the 2008 RTIP, and the 2009 TIP. Additionally, the Proposed Project would not significantly contribute to or cause deterioration of the existing air quality. Therefore, no adverse impacts would result from implementation of the proposed project and mitigation measures are not required.

Local Air Quality

The BAAQMD operates several air quality monitoring stations throughout the Basin. The San Leandro-County Hospital Monitoring Station is the closest monitoring station to the site. This station monitors O_3. The next closest monitoring station is the Fremont-Chapel Way Monitoring Station which monitors CO, NO_X, PM_{10}, and $PM_{2.5}$. The San Pablo-Rumrill Monitoring Station monitors sulfur oxides (SO_X). The data collected at these stations is considered to be representative of the air quality experienced on-site. Air quality data from 2006 to 2008 for the San Leandro-County Hospital Monitoring Station, the Fremont-Chapel Way Monitoring Station and the San Pablo-Rumrill Monitoring Station is provided in Table 2.3-2, *Local Air Quality Levels*.

Despite implementing many strict controls, the BAAQMD still fails to meet the Federal air quality standards for one of the criteria pollutants: $PM_{2.5}$. Because Federal pollution standards have not been achieved, the Basin is considered a non-attainment area for Federal Standards for this pollutant. For State standards, the Basin is designated as non-attainment for two of the criteria pollutants: O_3 and PM_{10}. There are no separate State criteria for $PM_{2.5}$.

Atmospheric concentrations of the other pollutants do not exceed State or Federal standards.

Table 2.3-2: Local Air Quality Levels

Pollutant	California Standard	Federal Standard	Year	Maximum[1] Concentration	Days (Samples) State/Federal Std. Exceeded
Ozone (O_3) (1-Hour) [2]	0.09 ppm for 1 hour	N/A	2006 2007 2008	0.088 ppm 0.071 0.096	0/0 0/0 1/0
Ozone (O_3) (8-Hour) [2]	0.070 ppm for 8 hours	0.08 ppm for 8 hours	2006 2007 2008	0.067 ppm 0.055 0.068	0/0 0/0 0/0
Carbon Monoxide (CO) [3]	9.0 ppm for 8 hours	9.0 ppm for 8 hours	2006 2007 2008	1.81 ppm 1.57 1.28	0/0 0/0 0/0
Nitrogen Dioxide (NO_2) [3]	0.030 ppm annual arithmetic mean	0.053 ppm annual average	2006 2007 2008	0.063 ppm 0.058 0.062	0/NA 0/NA 0/NA
	0.18 ppm for 1 hour				
Sulfur Dioxide (SO_2) [4]	0.04 ppm for 24 hours	0.14 ppm for 24 hours	2006 2007 2008	0.006 ppm 0.006 0.004	0/0 0/0 0/0
Particulate Matter (PM_{10}) [3,5,6]	50 $\mu g/m^3$ for 24 hours	150 $\mu g/m^3$ for 24 hours	2006 2007 2008	56.6 $\mu g/m^3$ 60.6 38.7	1/0 1/0 0/0
	20 $\mu g/m^3$annual arithmetic mean	50 $\mu g/m^3$ annual arithmetic mean			
Fine Particulate Matter ($PM_{2.5}$) [3,6]	No Separate State Standard	35 $\mu g/m^3$ for 24 hours	2006 2007 2008	43.9 $\mu g/m^3$ 51.2 21.0	NA/2 NA/2 NA/0
	12 $\mu g/m^3$ annual arithmetic mean	15 $\mu g/m^3$ annual arithmetic mean			

ppm = parts per million; PM_{10} = particulate matter 10 microns in diameter or less; NM = not measured; $\mu g/m^3$ = micrograms per cubic meter; $PM_{2.5}$ = particulate matter 2.5 microns in diameter or less; NA = not applicable.

Notes:

1. Maximum concentration is measured over the same period as the California Standards.
2. San Leandro-County Hospital Monitoring Station located at 15400 Foothill Boulevard, San Leandro, California 94578.
3. Fremont – Chapel Way Monitoring Station located at 40733 Chapel Way, Fremont, California 94538.
4. San Pablo-Rumrill Monitoring Station located at 1865 Rumrill Boulevard, San Pablo, California 94806
5. PM_{10} exceedances are based on state thresholds established prior to amendments adopted on June 20, 2002.
6. PM_{10} and $PM_{2.5}$ exceedances are derived from the number of samples exceeded, not days.

Table 2.3-2, Local Air Quality Levels, continued

Source: Aerometric Data Analysis and Measurement System (ADAM), summaries from 2006 to 2008, http://www.arb.ca.gov/adam.

Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than is the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and CO are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Surrounding the Project site to the east, southeast, and west is undeveloped land; to the north, the Union Pacific Railroad bisects the undeveloped land; refer to Exhibit 2.3-3, *Sensitive Receptor Locations*. The City of Oakland designates this surrounding land as Mixed Housing Type Residential, Central Business District, Institutional, and Estuary Plan Area. As a result, residential uses are located immediately northeast of the Proposed Project.

Localized Carbon Monoxide Analysis

Carbon monoxide is a colorless and odorless gas. The automobile and other types of motor vehicles are the main source of this pollutant in the Basin. CO concentrations are generally higher along roadways, especially in the early mornings. The State standard of CO is 35.0 parts per million, averaged over one hour.

The Basin is currently in attainment and attainment-maintenance for the State and Federal CO standards; respectively. However, the San Francisco Bay Area is a maintenance area for Federal CO standards. As indicated in Table 2.3-2, *Local Air Quality Levels*, CO levels have not been exceeded in the past three years at the San Leandro-County Hospital Monitoring Station.

Build Alternative

A local Carbon Monoxide (CO) screening analysis was performed to assess the potential for localized concentrations of CO to occur with implementation of the Proposed Project. The CO screening was conducted in accordance with the Local Analysis Flow Chart presented in the University of California, Davis, Institute of Transportation Studies, Transportation Project-Level Carbon Monoxide Protocol, revised December 1997. The flow chart is designed to assist the project sponsor(s) in evaluating the requirements that apply to specific projects. The flowchart utilized for this Project applies to new projects and was used in this local analysis conformity decision. The first step determined that the San Francisco Bay Area Basin is in attainment for CO, so the next step was to determine if the area was redesignated after the 1990 Clean Air Act. Since the Basin has not been redesignated, the next step was to make a determination to the Project's contribution to local air quality. The CO Protocol provides criteria to determine whether a project is likely to worsen air quality. These criteria include increases in vehicles operating in cold start mode, increases in traffic volumes, and a worsening of traffic flow.

The Proposed Project is an interchange improvement project that would improve traffic flow but would not create additional traffic. The Proposed Project does not involve parking lots, and therefore would not increase the number of vehicles operating in cold start mode. Although the Proposed Project would improve traffic flow, it would not contribute to traffic volumes. Therefore, the Proposed Project would not satisfy the criteria that the Project is likely to worsen air quality and will not create any new exceedences of the NAAQS. As a result, the Project has sufficiently addressed the CO impact and no further analysis was warranted.

Build Alternative (Roundabout)

The Build Alternative (Roundabout) would follow the same path as the Build Alternative in the CO Protocol's conformity requirement decision flowcharts. Additionally, since the Build Alternative (Roundabout) is an operational and safety improvements project, it would not increase traffic volumes, thereby resulting in similar CO emissions to the Build Alternative. Therefore, no adverse impacts of Build Alternative (Roundabout) were identified.

Construction Emissions

Build Alternative

Construction of the Project would require grading and other ground disturbing activities. As this Project is raising the reconstructed overcrossings, little grading is required below the ground surface other than that required for construction of the structure foundations. Short-term impacts to air quality would occur during minor grading/trenching and new pavement construction. Additional sources of construction-related emissions include:

- Exhaust emissions and potential odors from construction equipment used on the construction site as well as the vehicles used to transport materials to and from the site; and,
- Exhaust emissions from the motor vehicles of the construction crew.

Project construction would result in temporary emissions of CO, NO_X, ROG, $PM_{2.5}$, and PM_{10}. Stationary or mobile powered on-site construction equipment includes trucks, tractors, signal boards, backhoes, concrete saws, crushing and/or processing equipment, graders, pavers and other paving equipment. Based on the insignificant amount of daily work trips required for Project construction, construction worker trips are not anticipated to significantly contribute to or affect traffic flow on local roadways and are, therefore, not considered adverse. During the demolition phase, some asphalt concrete pavement would have to be removed.

In order to further minimize construction-related emissions, all construction vehicles and construction equipment would be required to be equipped with the state-mandated emission control devices pursuant to state emission regulations and standard construction practices. After construction of the Project is complete, all construction-related impacts would cease, and therefore no adverse impacts would result. Short-term construction PM_{10} emissions would be further reduced with the implementation of required dust suppression measures outlined within BAAQMD Regulation 6, Rule 1. Note that the California Department of Transportation Standard Specifications for

Construction (Sections 14-9.01 and 14-9.02 [Dust Control] and Section 39-3.06 [Asphalt Concrete Plants]) must also be adhered to. Therefore, Project construction is not anticipated to violate State or Federal air quality standards or contribute to existing air quality violations in the Basin.

Build Alternative (Roundabout)

The Build Alternative (Roundabout) is identical to the Build Alternative except for the intersection of East 9th Street/29th Avenue/northbound 29th Avenue on-ramp which would incorporate a roundabout. During the construction phase, adherence to the State emission regulations and standard construction practices would ensure that no adverse impacts would occur. Additionally, compliance with BAAQMD Regulation 6, Rule 1 would ensure no adverse impacts in regards to particulate matter emissions would result from implementation of the proposed project.

Naturally Occurring Asbestos

Build Alternative

While it is present all over the State of California, naturally occurring asbestos can be found most abundantly in and around Humboldt County, in areas of San Benito and Monterey counties, and in western El Dorado County. The Environmental Protection Agency's Pacific Southwest Region has a long history of involvement in assessing and minimizing the risk from asbestos in California, including Alameda, Calaveras, Fresno, Los Angeles, Santa Clara, Santa Cruz, San Benito, and San Mateo counties. According to a general ultramafic rock formation map created by the State of California Department of Conservation, Division of Mines and Geology, the Project site is not anticipated to be underlain by ultramafic rock formations.[8]

Build Alternative (Roundabout)

The Build Alternative (Roundabout) would occur in the same location as the Build Alternative. Additionally, Build Alternative (Roundabout) does not involve the demolition or renovation of any existing structures. As a result, the potential for impacts associated with asbestos is low. Therefore, no adverse impacts were identified.

Particulate Matter Analysis

Nonattainment areas are subject to the Transportation Conformity Rule, which requires local transportation and air quality officials to coordinate planning to ensure that transportation projects, such as road construction, do not affect an area's ability to reach its clean air goals. Transportation conformity requirements become effective one year after an area is designated as nonattainment.

The Basin will be redesignated as nonattainment for $PM_{2.5}$ by the EPA in December 2009. As stated above, conformity applies for $PM_{2.5}$ one year after the nonattainment designation is effective. However, the NEPA action (Environmental Assessment) for the Proposed Project is scheduled to be finalized after the one year period. Additionally, because of the new nonattainment designation, the MTC does not yet have the regional interagency consultation process in place. When the interagency consultation process for the MTC region is developed, the Project will be submitted to the interagency working group to determine if the Project is a project of air quality concern (POAQC). A qualitative particulate matter hot spot analysis has been conducted below to show that the Project is not anticipated to be a POAQC.

A qualitative hot spot analysis is defined in 40 CFR 93.101 as an estimation of likely future localized pollutant concentrations resulting from a new transportation project and a comparison of those concentrations to the relevant air quality standard. A hot spot analysis assesses the air quality impacts on a scale smaller than an entire nonattainment or maintenance area, including, for example, congested roadway intersections and highways or transit terminals. Such an analysis is a means of demonstrating that a transportation project meets Federal Clean Air Act conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts.

The EPA again published a final rule on March 10, 2006 (effective as of April 5, 2006) and established conformity criteria and procedures for transportation projects to determine their impacts on ambient $PM_{2.5}$ and PM_{10} levels in nonattainment and maintenance areas. The March 10, 2006 final rule requires a qualitative $PM_{2.5}$ and PM_{10} hot spot analysis to be completed for a POAQC. In order to implement the hot spot analysis requirements of the March 10, 2006 final rule, the *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (2006 Guidelines) was developed by the EPA and the FHWA. As of March 10, 2006, future qualitative $PM_{2.5}$ and PM_{10} hot spot analyses should be based on the 2006 Guidelines, which supersede the FHWA's existing September 12, 2001, *Guidance for Qualitative Project-Level "Hot Spot" Analysis in PM_{10} Nonattainment and Maintenance Areas.*

Build Alternative

The 2006 Guidelines identify five types of projects that are considered POAQC that require a PM_{10} hot spot analysis in 40 CFR 93.123:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles.
- Projects affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increase traffic volumes from a significant number of diesel vehicles related to the project.
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location.
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.
- Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ or PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The following discussion addresses the Proposed Project and the five project types identified within the 2006 guidelines.

The Project consists of operational and safety improvements at the 29th Avenue and 23rd Avenue overcrossings and operations of the surrounding intersections and ramps. Although the LOS for the 29th Avenue and East 10th Street intersection would not improve, this increase would not be from a significant number of diesel vehicles related to the Project. The Project does not propose changes to the I-880 mainline and would not redistribute a significant increase in diesel vehicles onto I-880. In addition, the percentage of heavy trucks would not increase between the No Build and Build scenarios. The Project would not result in any significant changes in traffic volumes, vehicle mix, location of the existing facility, or any other factor that would cause an increase in emissions impacts relative to the No Build Alternative.

The Proposed Project does not involve bus and rail terminals or transfer points with a significant number of diesel vehicles congregating at a single location. The Proposed Project would improve traffic flow and would not create new terminals or have diesel vehicles congregating in the area. Although I-880 is a major truck route in and out of the Port of Oakland, the Proposed Project would not expand or significantly increase the number of diesel vehicles congregating at a single location.

The Basin will be redesignated as nonattainment for $PM_{2.5}$ in December 2009. As a result, the BAAQMD has not prepared a $PM_{2.5}$ or PM_{10} implementation plan. The Proposed Project is included in the MTC's Transportation 2035 Plan, which was adopted December 2008, and found to conform to the SIP. The Project has, therefore, been accounted for and assessed in regional air quality planning. In addition, as stated above, since the Proposed Project is in a conforming TIP and RTP it therefore conforms to the State Implementation Plan and the design concept and scope has not been altered from the description in the TIP and RTP.

Based on the information provided above, the Project is not expected to introduce significant amounts of diesel truck traffic and is not considered a Project of significant concern per the definition contained within 40 CFR 93.123(b)(1). Thus, a less than significant impact with respect to $PM_{2.5}$ and PM_{10} would occur and a particulate matter hot-spot analysis is not required.

Build Alternative (Roundabout)

The Build Alternative (Roundabout) would incorporate a roundabout into the East 9th Street/29th Avenue/northbound 29th Avenue on-ramp intersection. Inclusion of a roundabout would not significantly change traffic volumes or fleet mixes. As with the Build Alternative, Build Alternative (Roundabout) is not expected to introduce significant amounts of diesel truck traffic and is not considered a Project of significant concern per the definition contained within 40 CFR 93.123(b)(1). Thus, no adverse impacts with respect to $PM_{2.5}$ and PM_{10} would occur and a particulate matter hot-spot analysis is not required.

Toxics Analysis

Diesel Particulate Matter

Diesel particulate matter is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is commonly found throughout the environment and is estimated by EPA's National Scale Assessment to contribute to the human health risk. Diesel exhaust is composed of two phases, either gas or particle, and both phases contribute to the risk. The gas phase is composed of many of the urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, and polycyclic aromatic hydrocarbons. The particle phase also has many different types of particles that can be classified by size or composition. Diesel particulates that are categorized as fine and ultra fine particles are of the greatest health concern. The composition of these fine and ultra fine particles may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines (i.e., on-road diesel engines of trucks, buses, and cars, off-road diesel engines that include locomotives, marine vessels, and heavy-duty equipment).

While there may possibly be diesel toxics emissions from the construction of a transportation project, the current scientific knowledge on diesel toxics is simply inadequate for conducting any meaningful quantitative assessment. The FHWA has issued an Interim Guidance on Air Toxic Analysis in NEPA Documents. It points out that ". . . air toxics analysis is an emerging field, and current scientific techniques, tools, and data are not sufficient to accurately estimate human health impacts that would result from a transportation project in a way that would be useful to decision-makers."[1]

The FHWA interim guidance suggests a number of minimization and mitigation measures for diesel toxics emissions from project construction. These measures can be summarized into three categories: (1) operational agreements, such as changing work shifts, reducing unnecessary engine idling; (2) technological adjustments and retrofits, such as particulate matter traps, oxidation catalysts; and, (3) use of clean fuels, such as ultra-low sulfur diesel. However, it should be noted that with the current absence of any Statewide or local regulation, the Department does not have the legal authority to require construction contractors to undertake any of these measures. It may only be possible for the Department to request that some of these measures be employed, on a case-by-case basis. However, when working with the contractors on this construction Project, efforts will be undertaken to minimize diesel toxic emissions to the extent feasible.

Mobile Source Air Toxics

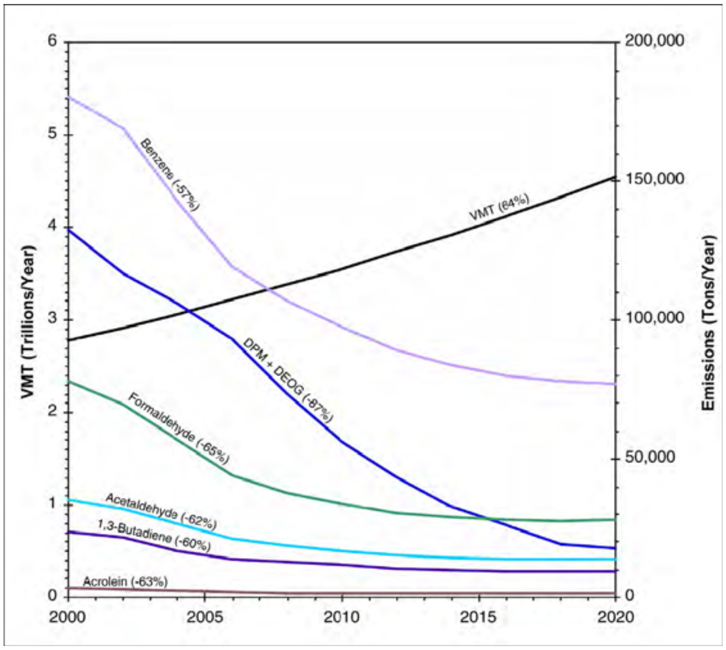
Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Federal Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA issued a *Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources*, *66 FR 17229* (March 29, 2001). This rule was issued under the authority in Section 202 of the Federal Clean Air Act. In its rule, the EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control

1 FHWA memorandum from Cynthia Burbank to Division Administrators, Feb. 3, 2006, page 4.

requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Even with a 64 percent increase in vehicle miles traveled (VMT) between years 2000 and 2020, FHWA projects will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by up to 65 percent, as well as reducing highway diesel particulate matter emissions by 87 percent, as shown in the following graph.

**U.S. Annual Vehicle Miles Traveled (VMT)
vs. Mobile Source Air Toxics Emissions 2000-2020**



Source: U.S. Department of Transportation Federal Highway Administration, Interim Guidance on Air Toxic Analysis in NEPA Documents, Feb. 3, 2006.

http://www.fhwa.dot.gov/environment/airtoxic/020306guidemem.htm

Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: Highway Statistics 2000, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

Therefore, the EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to control MSATs. The EPA is preparing a subsequent rule under the authority of Section 202(l) of the Federal Clean Air Act that will address these issues and make adjustments to the primary and secondary MSATs.

Unavailable Information for Providing a Project Specific MSAT Analysis

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then a final determination of health impacts based upon the estimated exposure. Providing a detailed analysis of each of these steps is difficult in that the available information is either incomplete or in the process of being independently validated. The following lists the current limitation in the available background information sources:

- **Emissions:** The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed.

  Additionally, in its discussions of particulate matter under the conformity rule, the EPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis, especially in relation to an analysis of re-entrained particulate matter.

- **Dispersion.** The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting concentrations of CO to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk, especially in relating to the settling velocity of particulate matter. The National Cooperative Highway Research Program (NCHRP) is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. The FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations, due to the fact that most air monitoring stations are set up for a regional scale to avoid results being affected by emissions from large scale transit facilities.

- **Exposure Levels and Health Effects.** It is difficult to accurately calculate annual concentrations of MSATs near roadways and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs. Any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts.

For different emission types, there are a variety of studies that are either statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or based on an assessment of animals demonstrating adverse health outcomes when exposed to large doses. To consolidate data and create a consistent information source, the EPA developed the Integrated Risk Information System (IRIS), which is a database of human health effects that may result from exposure to various substances found in the environment. The following toxicity information for the six prioritized MSATs was taken from the IRIS *Weight of Evidence Characterization* summaries. This information represents the EPA's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures:

- **Benzene –** Characterized as a known human carcinogen;
- **Acrolein –** The potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure;
- **Formaldehyde –** Probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals;
- **1,3-butadiene –** Characterized as carcinogenic to humans by inhalation;
- **Acetaldehyde –** Probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure; and,
- **Diesel exhaust –** Likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis.

Exposure relationships have not been developed from these studies. There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by the EPA and FHWA, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years. Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems.

Due to the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools allow a reasonable prediction of the relative change in emissions between alternatives for larger projects, the amount of MSAT emissions from each of the Project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this Project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the Project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*.[2] For the Proposed Project, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables, such as fleet mix are the same for the Build Alternative and No Build Alternative. The VMT estimated for the Build Alternative is slightly higher than that for the No Build Alternative on some roadway segments, because the proposed improvements to the ramps would redistribute traffic in these locations. Additionally, the proposed improvements could facilitate new development that attracts trips that were not occurring in this area before. Increases in VMT means MSATs under the Build Alternatives would probably be higher than the No Build Alternative on certain roadway segments. It should be noted that traffic volumes also decline on some roadway segments. There could also be localized differences in MSATs from indirect effects of the Project such as associated access traffic, emissions of evaporative MSATs (e.g., benzene) from parked cars, and emissions of diesel particulate matter from delivery trucks, depending on the type and extent of development. On a regional scale, this emissions increase would be offset somewhat by reduced travel to other destinations.

Because the estimated VMT under the Build Alternative and the No Build Alternative would be similar, it is expected there would be no appreciable difference in overall MSAT emissions. Emissions are virtually certain to be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future than they are today.

The improvements to the ramps and overcrossings contemplated as part of the Project Build Alternative would have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSATs would be higher. The localized differences in MSAT concentrations would likely be most pronounced along the new/expanded roadway sections that would be built at the 23rd Avenue and 29th Avenue ramps and overcrossings under the Build Alternative. However, as discussed above, the magnitude and the duration of these potential increases cannot be accurately quantified because of limitations on modeling techniques. Further, under all Alternatives, overall future MSATs are expected to be substantially lower than today due to implementation of EPA's vehicle and fuel regulations.

2 Federal Highway Administration, *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, Accessed January 30, 2009. www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm

Therefore, under the Build Alternative in the design year it is expected there would be higher MSAT emissions along some roadway segments in the study area, relative to the No Build Alternative, due to increased VMT. There could be slightly elevated but unquantifiable changes in MSATs to residents and others in a few localized areas where VMT increases, which may be important particularly to any members of sensitive populations. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Build Alternative (Roundabout)

The Build Alternative (Roundabout) would incorporate a roundabout into the East 9th Street/29th Avenue/northbound 29th Avenue on-ramp intersection and would not result in significant changes to the Build Alternative. Similar to the Build Alternative, efforts would be undertaken to minimize diesel toxic emissions to the extent feasible. On a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures

Construction Impacts

Dust control practices should be implemented to minimize or avoid potential exceedances of the PM_{10} air quality standard. In accordance with BAAQMD CEQA Guidelines, implementation of the following minimization measures, related to air quality (AQ) impacts, would reduce or eliminate the adverse effects of the Proposed Project:

AQ-1 To minimize potential impacts to air quality, during clearing, grading, earth moving, or excavation operations, excessive fugitive dust emissions should be controlled by regular watering or other dust preventive measures using the following BAAQMD dust control measures:

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads up to 15 mph.

- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.

AQ-2 To minimize air quality impacts, all trucks that are to haul excavated or graded material on-site should comply with State Vehicle Code Section 23114, with special attention to Sections 23114(b)(F), (e)(2), and (e)(4) as amended, regarding the prevention of such material spilling onto public streets and roads.

AQ-3 To minimize air quality impacts, the contractor should adhere to the California Department of Transportation Standard Specifications for Construction (Sections 14-9.01 and 14-9.02 [Dust Control] and Section 39-3.06 [Asphalt Concrete Plant Emissions]).

Operational Impacts

No avoidance, minimization, and/or mitigation measures are required, as the Project would not produce substantial operational air quality impacts.

2.3.5 Noise

2.3.5.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

California Environmental Quality Act

CEQA requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the project unless such measures are not feasible.

National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA (and the Department, as assigned) involvement, the federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA). Table 2.3-3, *Noise Abatement Criteria,* below lists the noise abatement criteria for use in the NEPA-23 CFR 772 analysis.

Table 2.3-3: Noise Abatement Criteria

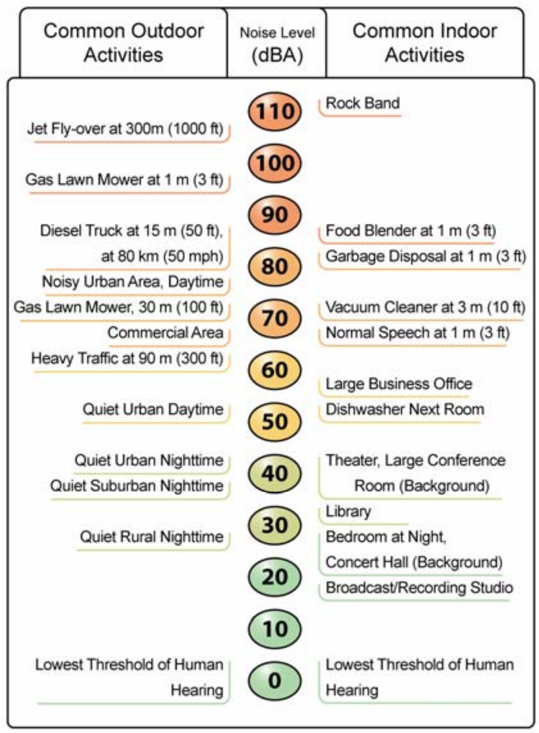


Table 2.3-4, *Noise Levels of Common Activities,* below lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise-levels discussed in this section with common activities.

Table 2.3-4: Noise Levels of Common Activities

Agency Category	NAC, Hourly A-Weighted Noise Level, dBA Leq (h)	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significant and serve and important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above
D	–	Undeveloped lands
E	52 Interior	Residence, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

In accordance with the Department's Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects, August 2006, a noise impact occurs when the future noise level with the Project results in a substantial increase in noise level (defined as a 12 dBA or more increase) or when the future noise level with the Project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC.

If it is determined that the Project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the Project plans and specifications. This document discusses noise abatement measures that would likely be incorporated into the Project.

The Department's Traffic Noise Analysis Protocol sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5 dBA reduction in the future noise level must be achieved for an abatement measure to be considered feasible. Other considerations include topography, access requirements, other noise sources, and safety considerations. The reasonableness determination is basically a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, newly constructed development versus development pre-dating 1978, and the cost per benefited residence.

2.3.5.2 Affected Environment

Developed land uses in the Project vicinity were identified through land use maps, aerial photography, and site inspection. Within each land use, sensitive receptors were identified. Noise-sensitive land uses in the area include single-family residences, places of worship, a recording studio, and schools. A Noise Study Report (August 2009) was prepared. The following is a brief description of the noise-sensitive land uses in the Project area:

- **North of I-880 and West of 29th Avenue.** Most of the noise-sensitive land uses within the study area are located north of I-880 and east of 29th Avenue where the neighborhood consists of one- and two-story single family residences on side streets that run perpendicular to I-880. These streets include Portwood Avenue, Lisbon Avenue, 27th Avenue, and 26th Avenue. Other noise-sensitive land uses include a recording studio (Studio 880) located at 829 27th Avenue and Mary Help of Christians Church and its associated side yard. Commercial buildings front East 8th Street between 29th Avenue and 27th Avenue, including a Shell gas station.
- **South of I-880, East of 29th Avenue.** East of 29th Avenue, the main noise-sensitive land use is Lazear Elementary School, which is adjacent to the existing 29th Avenue off-ramp. The noise-sensitive areas at the school include the south side by the lunch tables, some classroom buildings, and the playground east of the classrooms. South of I-880, the land uses are mainly commercial and industrial with the exception of some residences located east of 29th Avenue adjacent to the southbound I-880 on-ramp. Traffic-related noise along the west side of I-880 is not expected to change as a result of the Project.

The generalized land use data and location of particular sensitive receptors were the basis for the selection of the noise monitoring and analysis sites. A total of 12 long-term noise measurement locations, 16 short-term noise measurement locations (17 microphone positions), and an additional four short-term interior noise measurement locations at Lazear Elementary were modeled to represent the noise-sensitive land uses in the Project vicinity. These monitoring and modeling locations are shown in Exhibits 2.3-4 and 2.3-5, *Long and Short-Term Noise Measurement Locations*.

The primary source for noise for the sensitive receptors in the Project vicinity is traffic on I-880. Both long-term and short-term noise measurements were conducted to characterize the existing outdoor noise environment. Long-term measurements were made to provide information regarding peak hour noise levels due to vehicular traffic so as to assess existing noise impacts. This was done with the intention of providing a baseline record of current noise levels before the Project is built. However, in some locations, such as on local streets on the west side of I-880 where traffic noise is not dominated by I-880 traffic, but where construction of the Project could have an influence on the local environment due to slight changes in existing traffic patterns, short-term measurements were taken. Short-term noise measurements were taken in these areas to establish a baseline for pre-project ambient noise. The purpose of these measurements was to develop calibration factors for the noise model based on actual traffic volumes and vehicle speeds observed during the noise samples. The long-term noise measurements were conducted with battery-operated Larson Davis Series 800 noise dosimeters. Each monitor was enclosed in a weather proof kit with an external microphone and windscreen. Short-term measurements were conducted using Bruel & Kjaer Type I precision sound level meters input to digital audio tape (DAT) recorders.

The existing conditions were modeled using existing traffic volumes obtained from RBF Consulting dated November 13, 2008. The noise prediction method used in this analysis is FHWA's Traffic Noise Model (TNM) version 2.5. Traffic noise model results for existing conditions are summarized in Table 2.3-5, *Measured Short-Term Noise Levels vs. TNM Predictions – Existing Condition* and Table 2.3-6, *Lazear School: Noise Levels Measured at Several Rooms*. Traffic noise model results for Year 2035 Build Option with and without sound barrier walls are presented in Table 2.3-7, *TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Sound Barrier Wall Heights.*

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Base Map Source: Google Earth Pro

SD Mac: 35100463.003/35100463LandscapeTabloid.indd

INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS
AT 29TH AVENUE AND 23RD AVENUE OVERCROSSING IS/EA

Sensitive Receptor Locations

Exhibit 2.3-3

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Source: Noise Study Report, April 14, 2009

SOURCE: Wilson, Ihrig & Associates, Inc.

SD Mac: 35100463.003/35100463LandscapeTabloid.indd

INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS
AT 29TH AVENUE AND 23RD AVENUE OVERCROSSING IS/EA

Long and Short Term Noise Measurement Locations

Exhibit 2.3-4

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Source: Noise Study Report, April 14, 2009

AECOM RBF CONSULTING

SOURCE: Wilson, Ihrig & Associates, Inc.

SD Mac: 35100463.003/35100463LandscapeTabloid.indd

INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS
AT 29TH AVENUE AND 23RD AVENUE OVERCROSSING IS/EA

Long and Short Term Noise Measurement Locations

Exhibit 2.3-5

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Table 2.3-5: Measured Short-Term Noise Levels vs. TNM Predictions – Existing Condition

Receiver Location*	Noise Abatement Category and Criterion ( )	Hourly L_{eq} (dBA)		Model Adjustment Factor
		Actual	TNM	
ST-1	B (67)	70	74	-4
ST-2	B (67)	67	70	-3
ST-3	B (67)	73	74	-1
ST-4	B (67)	71	72	-1
ST-5a	B (67)	73	72	+1
ST-5b	B (67)	74	72	+2
ST-6‡	B (67)	77	78	-1
ST-7	B (67)	72	71	+1
ST-8	B (67)	75	76	-1
ST-9	B (67)	71	72	-1
ST-10	B (67)	70	68	+2
ST-11	B (67)	67	68	-1
ST-12	C (72)	71	73	-2
ST-13	B (67)	60	63	-3
ST-14	B (67)	62	63	-1
ST-15	B (67)	72	74	-2

Notes: See Exhibit 2.3-4 and Exhibit 2.3-5 for identification of each short-term location.

‡ Critical receiver

Table 2.3-6: Lazear School: Noise Levels Measured at Several Rooms

Location	Measured [dBA]	Abatement Category and Criterion ( )	HVAC*
Room 16	41	E (52)	OFF
Room 8	44	E (52)	ON
Room 30	53**	E (52)	OFF
Multi-Purpose Room	49	E (52)	ON

Notes: * HVAC noise dominated the room's noise environment.

** Significant noise leakage through window frames and transfer through light glass panes.

Table 2.3-7: TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Wall Heights for Noise Barrier 1 (NB-1)

Receiver I.D. ‡	Area	Barrier I.D.	Land Use	Address	Existing noise level Leq(h), dBA	I-880 Future Worst Hour Noise Levels - Leq(h), dBA														
						Design year noise level Leq(h), dBA				Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receivers (NBR)								
												10 feet			12 feet			14 feet		
						w/o project	w/ project	w/o project minus existing	w/ project minus no project†			Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	N-BR
1	C	NB-1	Residential	Portwood near E. 8th St.	77	79	**79**	2	0	B (67)	severe	69	10	-	67	12	-	66	13	-
1*	C	NB-1	Residential	Portwood near E. 8th St.	78	80	**80**	2	0	B (67)	severe	77	**3**	-	75	5	-	72	8	-
2	C	NB-1	Residential	Portwood near E. 9th St.	70	73	**73**	3	0	B (67)	A/E	68	5	-	65	8	-	64	9	-
2*	C	NB-1	Residential	Portwood near E. 9th St.	71	73	**73**	2	0	B (67)	A/E	70	**3**	-	69	**4**	-	67	6	-
3‡	B	NB-1	Residential	Lisbon near E. 8th St.	78	82	**81**	4	-1	B (67)	severe	73	7	12	70	11	17	68	12	29
3*	B	NB-1	Residential	Lisbon near E. 8th St.	80	84	**83**	4	-1	B (67)	severe	81	**2**	-	80	**3**	-	77	6	-
4	B	NB-1	Residential	Lisbon near E. 9th St.	65	70	**69**	5	-1	B (67)	A/E	66	**3**	-	65	**4**	-	64	5	-

Table 2.3-7: TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Heights for Noise Barrier 1 (NB-1), continued

Receiver I.D. ‡	Area	Barrier I.D.	Land Use	Address	Existing noise level Leq(h), dBA	I-880 Future Worst Hour Noise Levels - Leq(h), dBA														
						Design year noise level Leq(h), dBA				Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receivers (NBR)								
												10 feet			12 feet			14 feet		
						w/o project	w/ project	w/o project minus existing	w/ project minus no project†			Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	N-BR
4*	B	NB-1	Residential	Lisbon near E. 9th St.	67	70	**70**	3	0	B (67)	A/E	67	**3**	-	67	**3**	-	66	**4**	-
5	B	NB-1	Residential	27th Avenue near E. 8th St.	76	78	**78**	2	0	B (67)	severe	68	10	-	67	11	-	66	12	-
5*	B	NB-1	Residential	27th Avenue near E. 8th St.	77	81	**81**	4	0	B (67)	severe	78	**3**	-	75	6	-	72	9	-
6	B	NB-1	Residential	27th Avenue near E. 9th St	65	69	**69**	4	0	B (67)	A/E	65	**4**	-	64	5	-	63	6	-
6*	B	NB-1	Residential	27th Avenue near E. 9th St	66	69	**69**	3	0	B (67)	A/E	67	**2**	-	65	**4**	-	63	6	-
7	C	NB-1	Residential	Jingletown Town Homes	61	66	**67**	5	1	B (67)	A/E	66	**1**	-	66	**1**	-	66	**1**	-
8‡	A	NB-1	Park, Church	Kennedy Tract Park	74	78	**78**	4	0	B (67)	severe	69	9	2	67	11	2	66	12	2
9	D	-	Residential	Calcot Place	72	75	**75**	3	0	B (67)	-	–	–	–	–	–	–	–	–	–

Table 2.3-7: TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Heights for Noise Barrier 1 (NB-1), continued

Receiver I.D. ‡	Area	Barrier I.D.	Land Use	Address	Existing noise level Leq(h), dBA	I-880 Future Worst Hour Noise Levels - Leq(h), dBA														
						Design year noise level Leq(h), dBA				Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited Receivers (NBR)								
												10 feet			12 feet			14 feet		
						w/o project	w/ project	w/o project minus existing	w/ project minus no project†			Leq(h)	I.L.	NBR	Leq(h)	I.L.	NBR	Leq(h)	I.L.	N-BR
10	E	-	Residential	Miller St. and E. 11th St.	70	73	**72**	3	-1	B (67)	-	–	–	–	–	–	–	–	–	–
11	E	-	Commercial	E. 7th St. at 23rd Ave	71	73	**72**	2	-1	C (72)	-	–	–	–	–	–	–	–	–	–
12	E	-	Residential	E. 7th St. north of 29th Ave.	72	74	**74**	2	0	B (67)	-	–	–	–	–	–	–	–	–	–
13	E	-	Residential	E. 7th St. south of 29th Ave.	72	75	**75**	3	0	B (67)	-	–	–	–	–	–	–	–	–	–
14	E	-	Residential	Ford St. south of 29th Ave.	60	63	65	3	2	B (67)	-	–	–	–	–	–	–	–	–	–
18	A	NB-1	Park, Church	Mary Help of Christians Church near rear facade	71	76	**75**	5	-1	B (67)	severe	68	10	-	67	11	-	66	12	-
19‡	A	NB-1	Residential	Portwood at E. 8th St.	82	83	**83**	1	0	B (67)	severe	73	10	6	71	12	9	69	14	11

Table 2.3-7: TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Heights for Noise Barrier 1 (NB-1), continued

Notes:

*: Second story receivers. See the *Highway Design Manual.* (Reference 4, Section 1102.3(4))

‡ : Critical receiver

§: Area A is on the north end of NB-1, by Kennedy Tract Park

Area B is the center of the Jingletown neighborhood, roughly between Lisbon Avenue and 27th Avenue.

Area C is on the south end of NB-1, by the Shell gas station

Area D is further north from Area A, by I-880 and Calcot Place; outside the project area

Area E is on the west side of I-880; opposite the project area

1: Refer to Exhibit 2.3-6. 1st Story Receivers = 5 ft; 2nd Story Receivers = 15 ft.

2: SBW height referenced from residential side elevation.

3: SBW height referenced from 23rd Avenue off ramp elevation.

4: Peak Hour Equivalent Levels (Leq) in **bold** exceed the NAC.

5: Barrier Insertion Losses (I.L.) in **bold** do not meet the minimum 5 decibel requirement to justify such abatement at that particular receiver location

2.3.5.3 Environmental Consequences

Future noise levels were predicted for the Build and No Build Alternatives based on the Project traffic volumes for the year 2035. The future 2035 traffic volumes were derived from the PSR and noise level predictions were calculated to determine the need for noise abatement measures at existing developed lands (i.e., Jingletown Neighborhood). The FHWA NAC was previously presented in Table 2.3-3, *Noise Abatement Criteria*. In compliance with the policies and procedures outlined in the Protocol, including the evaluation of traffic noise impacts based on NAC, abatement measures are to be considered on all projects to the extent that reasonable opportunities exist to control noise.

Future Noise Impacts

Future 2035 Build Conditions

The future 2035 build conditions were modeled using the projected future 2035 build volumes obtained from the Draft Environmental Impact Transportation Analysis prepared by AECOM, dated May 7, 2009. The projections are based on peak hour volumes and assume free flow speed conditions as observed during the short-term measurements. The future 2035 build volumes were modeled to determine traffic noise impacts under the 2035 build condition. The modeled future noise levels were compared to the existing conditions to identify traffic impacts under 23 CFR 772. A summary of this comparison is provided in Table 2.3-7, *TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Wall Heights for Noise Barrier 1 (NB-1),* Table 2.3-8, *Lazear Elementary School Model Results – NB2 Option Analysis*, Table 2.3-9, *Lazear Elementary School Model Results – NB3 and NB4 Option Analysis*, and Table 2.3-10, *Lazear Elementary School Model Results – NB3 and NB5 Option Analysi*s. Feasible abatement measures were considered to reduce the noise impacts.

As indicated in the summary tables, the existing noise levels at all of the receiver locations currently exceed the noise abatement category (NAC) and criterion except at the following receiver I.D. locations: 4-Libson near East 9th Street; 6-27th Avenue near East 9th Street; 7-Jingletown Homes; and 14-Ford Street south of 29th Avenue. With or without implementation of the Proposed Project, the future noise levels at the receiver locations would continue to exceed the NAC. Implementation of the Proposed Project would increase noise levels at all of the receiver locations by a maximum of 2 dBA. As described below in the *Noise Abatement and Evaluation Section* and Section 2.3.5.4 *Avoidance, Minimization and Mitigation Measures*, in order to minimize adverse impacts, abatements to reduce those impacts have been proposed and the noise level reduction evaluated.

Build Alternative (Roundabout)

Build Alternative (Roundabout) is under consideration and has been included in the analysis for the technical studies. This option is identical to the Build Alternative except for the intersection of East 9th Street/ 29th Avenue/ northbound 29th Avenue on-ramp. The Build Alternative identifies this intersection point as a tee configuration that would be controlled by a traffic signal. Access to the Shell gas station would not be provided.

The Build Alternative (Roundabout) identifies the intersection point as a roundabout configuration.

No-Build Conditions

The future 2035 No Build conditions were modeled to compare the Build and No Build alternatives conditions to indicate the direct effect of the Project. A summary of the traffic noise modeling results for existing conditions and design year conditions with and without the Project are summarized in Table 2.3-7, *TNM Model Results for Year 2035 Build Option at Representative Neighborhood Locations and Various Wall Heights for Noise Barrier 1 (NB-1),* Table 2.3-8, *Lazear Elementary School Model Results – NB2 Option Analysis*, Table 2.3-9, *Lazear Elementary School Model Results – NB3 and NB4 Option Analysis*, and Table 2.3-10, *Lazear Elementary School Model Results – NB3 and NB5 Option Analysi*s.

Table 2.3-8: Lazear Elementary School Model Results – NB2 Option Analysis

Receiver I.D.	Area	Barrier I.D.	Land Use		Location	Existing Noise Level Leq(h), dBA	I-880 Future Worst Hour Noise Levels - Leq(h), dBA														
							Design yr noise level w/o project Leq(h), dBA	Design yr noise level w/project Leq(h), dBA	Design yr noise level w/o project minus existing conditions Leq(h), dBA	Design yr noise level w/project minus no project conditions Leq(h), dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited 100' Frontage Units (NBFU)								
													8 feet			10 feet			12 feet		
													Leq(h)	I.L.	NBFU	Leq(h)	I.L.	NBFU	Leq(h)	I.L.	NBFU
15‡	D	NB-2	School		Tables	70	73	**71**	**3**	**-2**	B (67)	A/E	65	6	4	64	7	4	62	9	4
16	D	NB-2	School		S. Side of Classrooms	68	70	**71**	**3**	**1**	B (67)	A/E	68	**3**	0	67	**4**	0	66	5	3
17	D	NB-2	School		E. of classrooms at playground near grass field	63	67	**68**	63	1	B (67)	A/E	67	**1**	0	67	**1**	0	67	**1**	0

Notes:

‡ : Critical receiver

A/E: Approaches or exceeds Noise Assessment Criteria (NAC)

1: NB-2 runs along the east edge of the 29th Avenue off ramp

2: Peak Hour Equivalent Levels (Leq) in **bold** approach or exceed the NAC

3: Barrier Insertion Losses (I.L.) in **bold** do not meet the minimum 5 decibel requirement to justify such abatement at that particular receiver location

Table 2.3-9: Lazear Elementary School Model Results – NB3 and NB4 Option Analysis

Receiver I.D.	Area	Barrier I.D.	Land Use		Location	Existing Noise Level Leq(h), dBA	I-880 Future Worst Hour Noise Levels - Leq(h), dBA														
							Design yr noise level w/o project Leq(h), dBA	Design yr noise level w/project Leq(h), dBA	Design yr noise level w/o project minus existing conditions Leq(h), dBA	Design yr noise level w/project minus no project conditions Leq(h), dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited 100' Frontage Units (NBFU)								
													8 feet			10 feet			12 feet		
													Leq(h)	I.L.	NBFU	Leq(h)	I.L.	NBFU	Leq(h)	I.L.	NBFU
15	D	NB-3 NB-4	School		Tables	71	73	**71**	2	-2	B (67)	A/E	68	**3**	0	66	5	4	66	5	4
16‡	D	NB-3 NB-4	School		S. Side of Classrooms	68	70	**71**	2	1	B (67)	A/E	64	7	3	62	9	3	60	11	3
17	D	NB-3 NB-4	School		E. of Classrooms at Playground near grass field	63	67	**68**	4	1	B (67)	A/E	67	**1**	0	65	**3**	0	64	**4**	0

Notes:

‡ : Critical receiver

A/E: Approaches or exceeds Noise Assessment Criteria (NAC)

1: NB-3 runs along the south property line. NB-4 runs along the west property line. Both fall outside Department right-of-way.

2: Peak Hour Equivalent Levels (Leq) in **bold** approach or exceed the NAC

3: Barrier Insertion Losses (I.L.) in **bold** do not meet the minimum 5 decibel requirement to justify such abatement at that particular receiver location

Table 2.3-10: Lazear Elementary School Model Results – NB3 and NB5 Option Analysis

Receiver I.D.	Area	Barrier I.D.	Land Use		Location	Existing Noise Level Leq(h), dBA	I-880 Future Worst Hour Noise Levels - Leq(h), dBA														
							Design yr noise level w/o project Leq(h), dBA	Design yr noise level w/project Leq(h), dBA	Design yr noise level w/o project minus existing conditions, Leq(h), dBA	Design yr noise level w/project minus no project conditions Leq(h), dBA	Activity Category (NAC)	Impact Type	Noise Prediction with Barrier, Barrier Insertion Loss (I.L.), and Number of Benefited 100' Frontage Units (NBFU)								
													8 feet			10 feet			12 feet		
													Leq(h)	I.L.	NBFU	Leq(h)	I.L.	NBFU	Leq(h)	I.L.	NBFU
15	D	NB-3 NB-5	School		Tables	71	73	**71**	2	-2	B (67)	A/E	68	**3**	0	66	5	1	66	5	1
16‡	D	NB-3 NB-5	School		S. Side of Classrooms	68	70	**71**	2	1	B (67)	A/E	65	6	4	64	7	4	64	7	4
17	D	NB-3 NB-5	School		E. of Classrooms at Playground near grass field	63	67	**68**	4	1	B (67)	A/E	67	**1**	0	66	**2**	0	64	**4**	0

Notes:

‡ : Critical receiver

A/E: Approaches or exceeds Noise Assessment Criteria (NAC)

1: NB-3 runs along the south property line and NB-5 west of the lunch tables. Both sound walls fall outside Department right-of-way.

2: Peak Hour Equivalent Levels (Leq) in **bold** exceed the NAC.

3: Barrier Insertion Losses (I.L.) in **bold** do not meet the minimum 5 decibel requirement to justify such abatement at that particular receiver location

Noise Abatement Evaluation

The Noise Abatement Decision Report (NADR) evaluates potential traffic noise impacts and recommends abatement measures such as sound barriers to protect noise-sensitive land uses affected by the Proposed Project. Acoustical and non-acoustical feasibility factors and the relationship between noise abatement allowances and the engineer's cost estimate are evaluated. Noise abatement measures were studied for receptors located within the Project limits that would be or would continue to be exposed to traffic noise levels approaching or exceeding the NAC.

The NADR does not present the final decision regarding noise abatement; rather, it presents key information on abatement to be considered throughout the environmental review process. The final overall reasonableness decision will take this information into account, along with other reasonableness factors identified during the environmental review process. These factors may include:

- Impacts of abatement construction;
- Public and local agency input;
- Life cycle of abatement measures;
- Views/opinions of impacted residents; and,
- Social, economic, environmental, legal, and technological factors.

The noise abatement potential of seven different sound wall barriers within five different locations was analyzed for the Proposed Project. Table 2.3-11, *Summary of Barrier Evaluation*, presents a summary of the barrier evaluation from the Noise Study Report/Noise Impact Analysis (NSR). A summary discussion of each of the sound wall barriers has been provided below.

The NSR and NADR provided the following information regarding the proposed sound barriers: a range of height, approximate length, receptor locations protected, noise attenuation range, number of benefited frontage units, reasonable allowance per frontage unit, total reasonable allowance, sound barriers numbers, and feasibility. Based on the studies, sound barriers have been determined to be feasible for three of the 12 sound barriers analyzed.

Table 2.3-11, *Summary of Barrier Evaluation*, summarizes the reasonability for sound barriers. The table also lists the sound barrier heights, number of benefited frontage units, reasonable allowance per frontage unit, total reasonable allowance, and sound barrier numbers.

Table 2.3-12, *Summary of Abatement Key Information*, provides additional information including acoustically feasibility, and a cost difference comparison of reasonable allowance and estimated construction costs for all the sound barrier options analyzed. Table 2.3-13, *Noise Barrier Cost Analysis Summary*, provides a summary of abatement information, and includes the barrier number, barrier location, approximate I-880 station from beginning to end, length, height, total reasonable allowance, and estimated total sound barrier construction costs for the six sound barrier walls determined to be feasible for the Proposed Project.

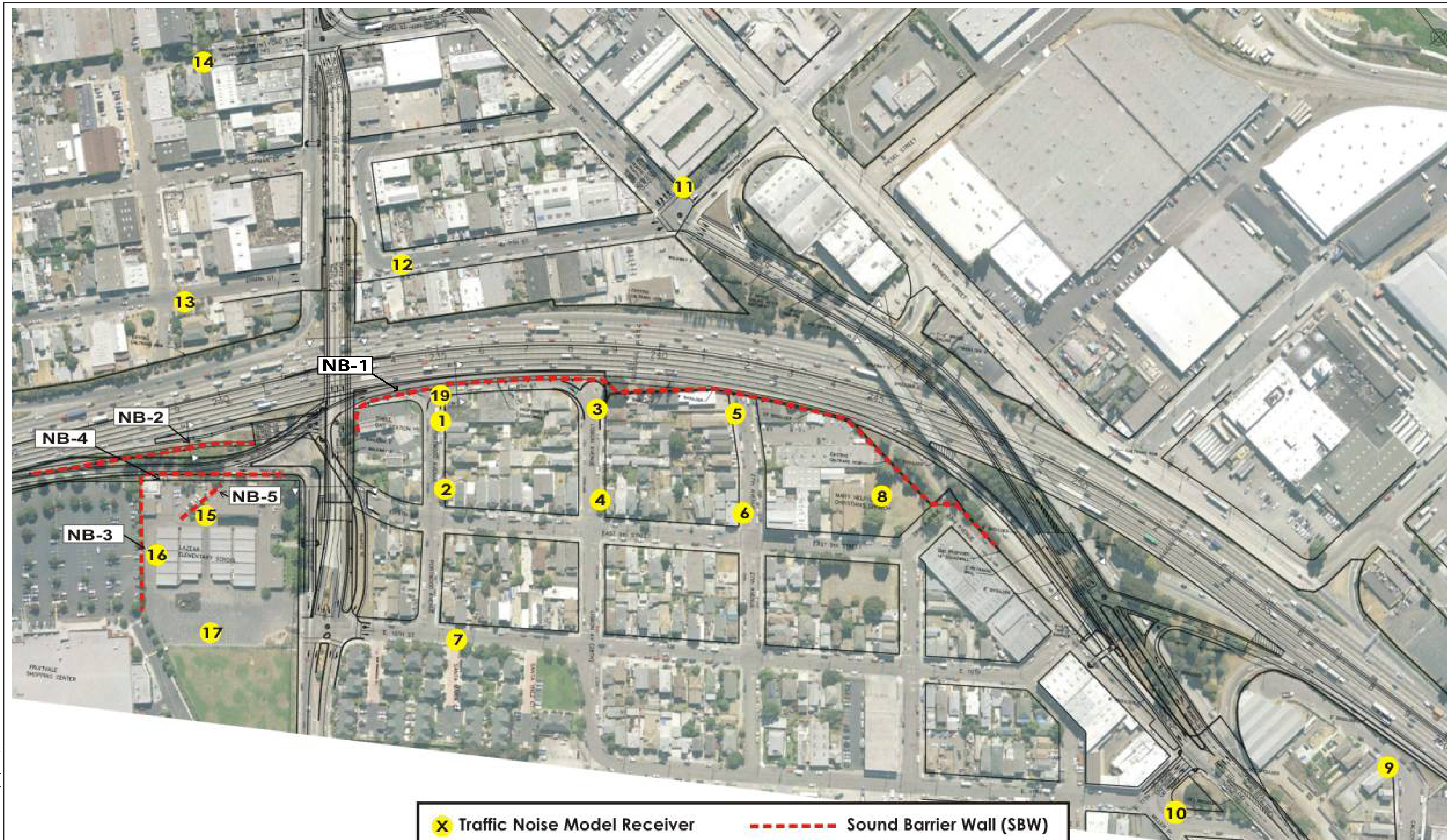
The noise abatement analysis examined 12 noise barriers of varying heights. Although all of the noise barriers met the feasibility criteria of the 5 dBA noise reduction, only three are considered reasonable from a cost perspective, as summarized above; refer to Exhibit 2.3-6, *Traffic Noise Model Receiver and Sound Barrier Wall Options*. The three recommended noise barriers are as follows:

- NB1: 1,660 feet long and 14 feet in height
- NB3: 300 feet long and 10 feet in height
- NB5: 95 feet long and 8 feet in height

The reasonableness of a sound barrier was determined by comparing the estimated cost of the project against the total reasonable allowance. The total reasonable allowance was determined based on the number of benefited residences multiplied by the reasonable allowance per residence. If the estimated sound barrier construction cost exceeded the total reasonable allowance, the sound barrier was determined to be not reasonable. However, if the estimated sound barrier construction cost is within the total reasonable allowance, the sound barrier was determined to be reasonable.

The recommended height for NB-1 is 14 feet in order to provide the maximum benefit to the greatest number of residences. NB-1 costs less than the reasonable allowance by $574,520. In addition, the Jingletown community has voiced strong support for the northern section of noise barrier NB-1 to provide noise protection for the Mary Help of Christians Church and the Kennedy Tract Park. The abatement provided by this sound wall would lower traffic noise levels to approximately 66 dBA at the two receiver locations in the Kennedy Tract Park and near the Mary Help of Christians Church rear façade.

The recommended noise barrier option for mitigating noise at outdoor noise-sensitive areas at Lazear Elementary is Option 3, as described in the NSR. Under this option, NB-5 would be constructed 8 feet in height to provide abatement at the lunch tables, which are areas considered to be of frequent human use. In addition, NB-3 would be constructed 10 feet in height to provide noise abatement to outdoor areas along the south of the school property and to lower interior noise levels at classrooms facing south as well as to recreation areas on the east play yard areas of the school. This was the only combination of walls studied that provided a solution where the cost was less than the identified allowance. As indicated in Table 2.3-12, *Summary of Abatement Key Information*, the cost of the wall ($289,520) was $39,480 less than the reasonable allowance ($329,000). However, it should be noted that, under this option, these soundwalls would be funded by the Project, yet constructed and maintained by the School.



Source: Noise Study Report, April 14, 2009

AECOM

RBF CONSULTING

MAP SOURCE: Google Earth Pro

SD Mac: 35100463.003/35100463LandscapeTabloid.indd

INTERSTATE 880 OPERATIONAL AND SAFETY IMPROVEMENTS
AT 29TH AVENUE AND 23RD AVENUE OVERCROSSING IS/EA

Traffic Noise Model Receiver and Sound Barrier Wall Options

Exhibit 2.3-6

placeholder

Table 2.3-11: Summary of Barrier Evaluation from Noise Study Report

Barrier	Station	Height (feet)[a]	Noise Reduction (dBA)	Acoustically Feasible?	Number of Benefited Residences	Reasonableness Allowance per Unit	Total Reasonable Allowance
NB1	233+00 to 249+20	10	7	Yes	20	$53,000[b]	$1,060,000
		12	11	Yes	28	$55,000[b]	$1,540,000
		14	12	Yes	42	$57,000[b]	$2,394,000
NB2	225+60 to 230+60	8	6	Yes	4	$47,000[c]	$188,000
		10	7	Yes	4	$47,000[c]	$188,000
		12	8	Yes	7	$47,000[c]	$329,000
NB3 & NB4 Option	228+00 to 231+60	8	7	Yes	3	$47,000[c]	$141,000
		10	9	Yes	7	$49,000[c]	$343,000
		12	11	Yes	7	$49,000[c]	$343,000
NB3 & NB5 Option	228+00 to 231+60	8+6	6	Yes	4	$47,000[c]	$188,000
		10+8	7	Yes	7	$47,000[c]	$329,000
		12+10	7	Yes	7	$47,000[c]	$329,000

Source: I-880 Noise Abatement Decision Report, August 2009

Notes:

a As measured from the neighborhood side.

b Reasonableness Allowance is per Residence and depends on achievable noise reduction at critical receiver #3. Residences on second story counted as additional, separate units as most units are stacked duplex type.

c Reasonableness Allowance is per Frontage Unit and depends on achievable noise reduction at each 100-foot frontage unit.

Table 2.3-12: Summary of Abatement Key Information

Barrier	Height (feet)	Acoustically Feasible?	Number of Benefited Residences	Total Reasonable Allowance	Estimated Construction Cost	Difference (Allowance – Cost)	Cost Less Than Allowance?
NB1	10	Yes	20	$1,060,000	$1,308,200	($248,200)	No
	12	Yes	28	$1,540,000	$1,563,840	($23,840)	No
	14	**Yes**	**42**	**$2,394,000**	**$1,819,480**	**$574,520**	**Yes**
NB2	8	Yes	4	$188,000	$318,000	($130,000)	No
	10	Yes	4	$188,000	$395,000	($207,000)	No
	12	Yes	7	$329,000	$472,000	($143,000)	No
NB3 & NB4 Option	8	Yes	3	$141,000	$400,400	($259,400)	No
	10	Yes	7	$343,000	$500,500	($157,500)	No
	12	Yes	7	$343,000	$600,600	($257,600)	No
NB3 & NB5 Option	8+6	Yes	4	$188,000	$228,690	($40,690)	No
	10+8	**Yes**	**7**	**$329,000**	**$289,520**	**$39,480**	**Yes**
	12+10	Yes	7	$329,000	$350,350	($21,350)	No

Source: I-880 Noise Abatement Decision Report, August 2009

Table 2.3-13: Noise Barrier Cost Analysis Summary

Barrier	Number of Benefited Residences	Barrier Location	Approximate I-880 Station	Barrier Configuration		Total Reasonable Allowance		Barrier Lengths / Height					Barrier Total		Wall Cost @ $70 / SF	Additional Construction Cost Factors		
				Height	Length	Per Residence	Per Wall	6	8	10	12	14	Length	Area		Traffic Control	10 % Contingency	Total Cost
NB1	20	Along I-880 between 29th and 23rd Ave	233+00 – 249+20	10	1660	$53,000	$1,060,000			1660			1660	16600	$1,162,000	$30,000	$116,200	$1,308,200
	28			12	1660	$55,000	$1,540,000				1660		1660	19920	$1,394,400	$30,000	$139,440	$1,563,840
	42			14	1660	$57,000	$2,394,000					1660	1660	23240	$1,626,800	$30,000	$162,680	$1,819,480
NB2	4	29th Ave Off-Ramp	225+60 - 230+60	8	500	$47,000	$188,000		500				500	4000	$280,000	$10,000	$28,000	$318,000
	4			10	500	$47,000	$188,000			500			500	5000	$350,000	$10,000	$35,000	$395,000
	7			12	500	$47,000	$329,000				500		500	6000	$420,000	$10,000	$42,000	$472,000
NB3 & NB4 Option	3	South & West of School Property Line	228+00 - 231+60	8	650	$47,000	$141,000		650				650	5200	$364,000	$0	$36,400	$400,400
	7			10	650	$49,000	$343,000			650			650	6500	$455,000	$0	$45,500	$500,500
	7			12	650	$49,000	$343,000				650		650	7800	$546,000	$0	$54,600	$600,600
NB3 & NB5 Option	4	South School Property Line and Tables	228+00 - 231+60	8 6	300 95	$47,000	$188,000	95	300				395	2970	$207,900	$0	$20,790	$228,690
	7			10 8	300 95	$47,000	$329,000		95	300			395	3760	$263,200	$0	$26,320	$289,520
	7			12 10	300 95	$47,000	$329,000			95	300		395	4550	$318,500	$0	$31,850	$350,350

Temporary Construction Impacts

Noise produced by construction equipment varies substantially depending upon the type of equipment being used and its operation. Construction noise is generally of relatively short duration, lasting from a few days to a period of months. Noise impacts associated with construction activities would typically occur in several distinct phases, each with its own noise characteristics.

The first phase, site preparation, is generally the noisiest and has the shortest duration. Activities that occur during this phase include earthmoving and compacting of soils. High noise levels are created during this phase from the operation of heavy duty trucks, backhoes, and front-end loaders. Noise levels typically range from 73 to 96 dBA at 15 meters (50 feet) from individual pieces of equipment.

Noise transmission from construction activities may potentially impact nearby residences temporarily depending on the type of equipment and duration of operations. During construction of the Project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Construction noise is regulated by the California Department of Transportation Standard Specifications Section 14-8.02 "Noise Control," which states that noise levels generated during construction should comply with applicable local, State, and Federal regulations, and that all equipment should be fitted with adequate mufflers according to the manufacturers' specifications. Temporary noise associated with project construction will not increase existing noise levels greater than the NAC of 12 dBA. Compliance of noise regulations and the implementation of Minimization Measures NOI-1 through NOI-4 would lessen any construction noise impacts to acceptable levels. In addition, as existing noise levels exceed noise level criteria, the area is currently exposed to noise levels that dominate the noise environment of the area. Similar to anticipated operating conditions the noise introduced as related to project construction will not increase the existing noise level greater than the NAC of 12 dBA threshold, and therefore in combination with compliance with noise regulations and minimization measures incorporated onto construction equipment, and described in minimization measures NOI-1 through NOI-4, no adverse temporary construction impacts were identified.

It is anticipated that construction hours would generally be restricted and/or limited during nights and weekends. However, improvements to I-880 at the 29th and 23rd Avenue overcrossings may involve some nighttime construction activities to minimize traffic disruption. The approach to construction will not be completed until final design.

Potential noise impacts from Project construction would primarily be short-term for the Build Alternative. No additional temporary noise impacts are anticipated.

2.3.5.4 Avoidance, Minimization, and/or Mitigation Measures

Implementation of the following minimization measures, related to noise (NOI) impacts, would reduce or eliminate the adverse effects of the Proposed Project:

NOI-1 To minimize potential impacts, and based on the studies completed to date, the Department intends to incorporate noise abatement in the form of (a) barrier(s), NB-1, at the Jingletown Neighborhood, Mary Help of Christian Church, and the Kennedy Tract Park, 1,660 feet long and 14 feet high.

Calculations based on preliminary design data indicate that the barrier(s) will reduce noise levels up to 12 dBA for 42 residences at a cost of $1,819,480. If, during final design, conditions have substantially changed, noise abatement may not be necessary. The final decision of the noise abatement will be made upon completion of the Project design and the public involvement processes.

NOI-2 To minimize potential impacts, and based on the studies completed to date, the Department intends to incorporate noise abatement in the form of (a) barrier(s), (NB-3) and (NB-5) at Lazear Elementary, with respective lengths and average heights of the following: 300 feet long and 10 feet high for NB-3 and 95 feet long and 8 feet high for NB-5. Calculations based on preliminary design data indicate that the barrier(s) will reduce noise levels from 7 dBA for 7 frontage units at a cost of $289,520. If, during final design, conditions have substantially changed, noise abatement may not be necessary. The final decision of the noise abatement will be made upon completion of the Project design and the public involvement processes.

NOI-3 To minimize potential impacts, construction noise for projects on the state highway system is also regulated by the Department's Standard Specifications. Section 14-8.02 "Noise Control" in the Standard Special Provisions, states in part:

"Sound control shall conform to the provisions in Section 14-8.02 'Noise Control', of the Standard Specifications and these special provisions. The noise level from the Contractor's operations, between the hours of 9:00 PM and 6:00 AM, shall not exceed 86 dBA at a distance of 50 feet. This requirement in no way relieves the contractor from responsibility for complying with local ordinances regulating noise level. The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixer or transient equipment that may or may not be owned by the contractor. The use of loud signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel."

NOI-4 To minimize noise impacts associated with pile driving, construction activities will be restricted to daytime hours or employ the use of drilled pier foundations instead of driven piles. In addition, to minimize vibration impacts, drilled pier foundations instead of driven piles, using low-displacement driven H-piles or large-diameter pipe piles instead of concrete or small-diameter pipe piles, or pre-drilling a portion of the driven pile foundation will be utilized.

NOI-5 Project-specific measures necessary to minimize adverse construction noise impacts on the community shall be incorporated in the Project plans and specifications.

2.3.5.5 CEQA Noise Analysis

When determining whether a noise impact is significant under CEQA, comparison is made between the Build Year 2035 Without Project noise level and the Build Year 2035 With Project noise level. The CEQA noise analysis is completely independent of the

NEPA-23 CFR 772 analysis discussed above, which is centered largely on noise abatement criteria. Under CEQA, the assessment entails looking at the setting of the noise impact and then how large or perceptible any noise increase would be in the given area. Key considerations include: the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected and the absolute noise level.

The Build Year 2035 Without Project noise levels near residential sensitive receptors within the Project vicinity range from 63 to 84 dBA. The majority of noise measurement locations are anticipated to exceed the common noise level of 67 dBA for residential and school uses under the Build Year 2035 Without Project conditions. The predicted noise level near residential sensitive receptors under the Build Alternative would range from 65 dBA to 83 dBA. The increase in dBA between the Build Year 2035 Without Project noise levels and the Build Alternative would not exceed 3 dBA. The Department considers an increase in 3 dBA to be the minimum noise level that is perceptible to the human ear and an imperceptible increase is not significant. As such, the increase of 2 dBA or less as a result of implementation of the Proposed Project would result in less than significant impacts under CEQA.

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